



SUBMITTAL

Project

BLDG 840

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Prepared By:

05/22/2011
07:36AM

(NASA VAFB 840, SD-03, Item: Dimensional Data and Equipment and Performance Data)

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A

Tag Cover Sheet
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Spec Sheet

Unit Report For A

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Unit Parameters

Unit Model:.....50PG-M12-AH5--QQ
Unit Size:.....12 (10 Tons)
Volts-Phase-Hertz:.....208-3-60
Heating Type:.....None
Duct Cfg:**Horizontal Supply/Horizontal Return (Field**

Convertible - no kit required)
Heating Capacity:

Dimensions (ft. in.) & Weight (lb.) ***

Unit Length:.....8' 6.56"
Unit Width: 5' 3.18"
Unit Height: 4' 4.05"
Base Unit Weight:.....1199 lb

*** Weights and Dimensions are approximate. Weight does not include roof curbs, unit packaging, field installed accessories or factory installed options. Approximate dimensions are provided primarily for shipping purposes. For exact dimensions and weights, refer to appropriate product data catalog.

Lines and Filters

Condensate Drain Line Size:.....3/4 in.
Return Air Filter Type:.....Throwaway
Return Air Filter Quantity:.....4
Return Air Filter Size:.....20x25x2

Unit Configuration

No Electric Heat
Electro-Mechanical Controls
Low Range Motor/Drive with Vertical SA/RA
E-Coated Cu/Cu Cond and Evap
Standard - No EnergyX
Powered 115 v GFI Convenience Outlet
Non-Fused Disconnect

Warranty Information

5-Year compressor (STD.)
1-Year parts (STD.)

No optional warranties were selected.

NOTE: Please see Warranty Catalog 500-089 for explanation of policies and ordering methods.

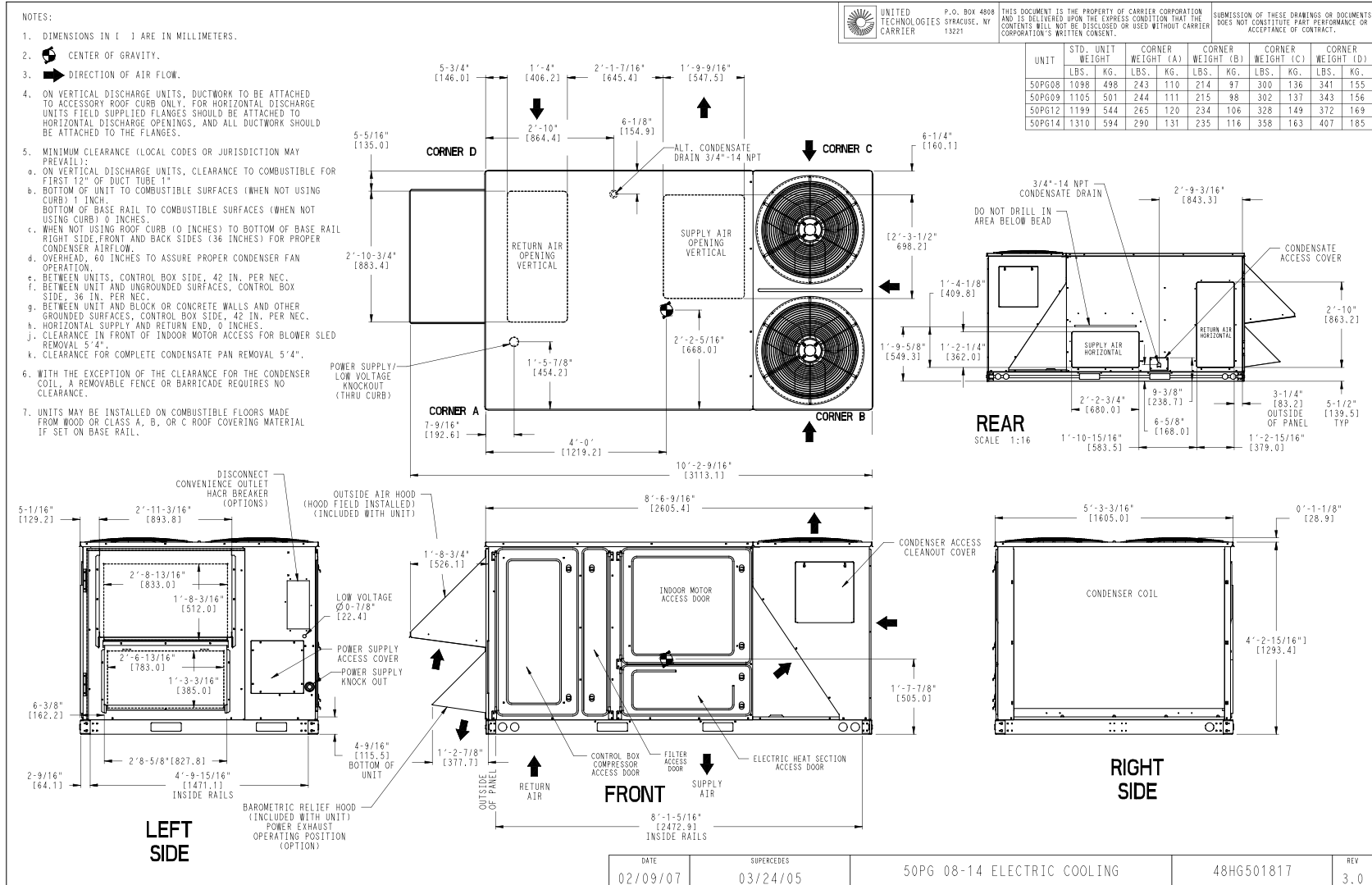
Ordering Information

Part Number	Description	Quantity
50PG-M12-AH5--QQ	Rooftop Unit	1

Certified Drawing for A

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Performance Summary For A

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Part Number:50PG-M12-AH5--QQ

ARI EER: 12.20
IPLV:..... 13.1

Base Unit Weight:..... 1199 lb
Base Unit Dimensions
Unit Length:..... 102.6 in
Unit Width: 63.2 in
Unit Height: 52.1 in

Unit Voltage-Phase-Hertz: 208-3-60
Air Discharge:..... Horizontal
Fan Drive Type:.....Belt
Actual Airflow: 3300 CFM
Site Altitude:..... 0 ft

Cooling Performance

Condenser Entering Air DB: 95.0 F
Evaporator Entering Air DB: 80.0 F
Evaporator Entering Air WB: 67.0 F
Entering Air Enthalpy: 31.44 BTU/lb
Evaporator Leaving Air DB: 56.0 F
Evaporator Leaving Air WB: 55.2 F
Evaporator Leaving Air Enthalpy: 23.27 BTU/lb
Gross Cooling Capacity: 121.28 MBH
Gross Sensible Capacity:..... 85.42 MBH
Compressor Power Input: 8.13 kW
Coil Bypass Factor:..... 0.080

Supply Fan

External Static Pressure:..... 1.60 in wg
Fan RPM:..... 887
Fan Power:..... 1.78 BHP
NOTE:..... Low Range Fan Option

Electrical Data

Compressor #1 RLA: 17.6
Compressor #1 LRA: 123
Compressor #2 RLA: 17.6
Compressor #2 LRA: 123
Outdoor Fan Motor Qty: 2
Outdoor Fan FLA (ea):..... 1.9
Indoor Fan Motor Type:..... Low
Indoor Fan Motor FLA: 7.5
Power Supply MCA:..... 55.7
Power Supply MOCP, Fuse or HACR, U.S.A.: 70
Min. Unit Disconnect FLA:..... 59
Min. Unit Disconnect LRA: 315
Electrical Convenience Outlet: YES
Voltage Range:..... 187-253

Acoustics

Sound Rating:..... 80.0 db
Sound Power Levels, db re 10E-12 Watts

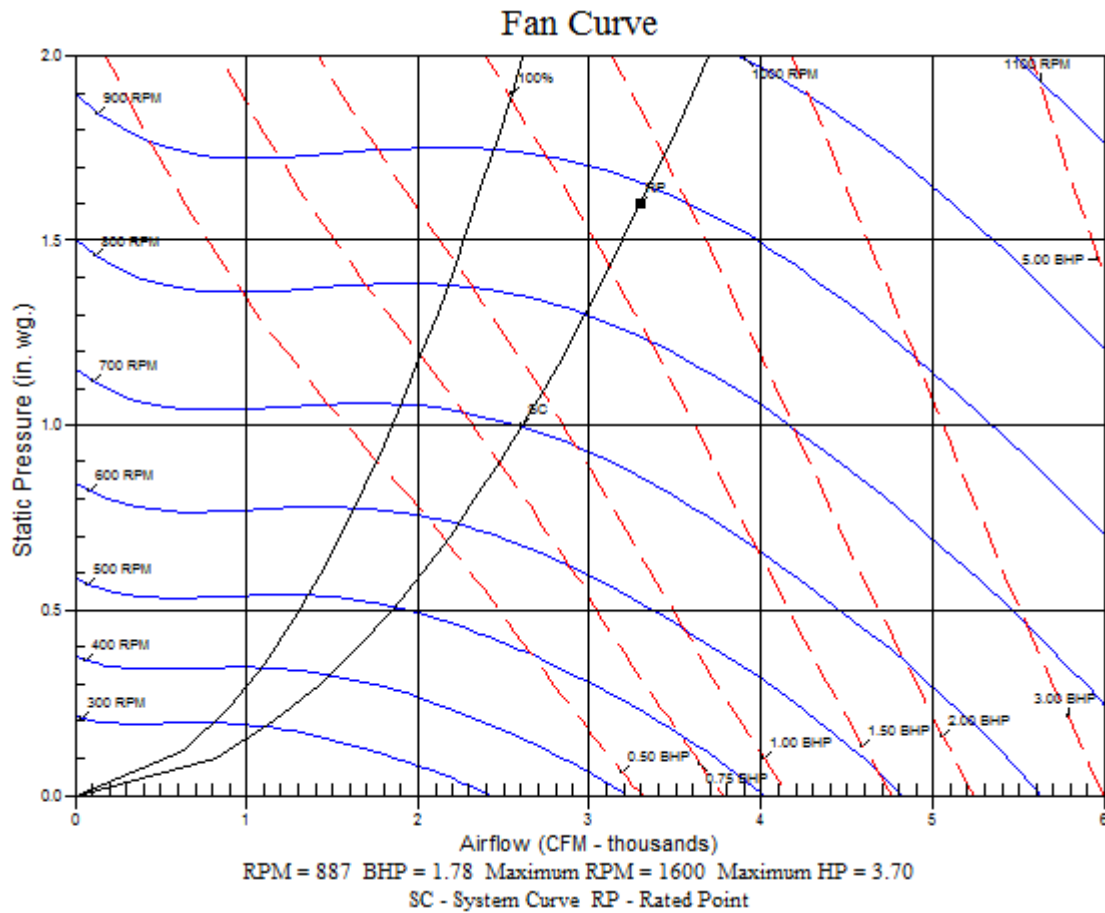
	Discharge	Inlet	Outdoor
63 Hz	86.1	82.5	90.4

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125 Hz	81.6	75.3	83.1
250 Hz	73.8	65.0	80.9
500 Hz	64.4	57.1	77.8
1000 Hz	64.1	55.1	75.2
2000 Hz	64.5	53.5	70.0
4000 Hz	64.8	54.9	66.1
8000 Hz	60.4	48.9	57.6
A-Weighted	73.0	64.8	80.0





Guide Specifications

Packaged Rooftop Electric Cooling Unit with Electric Heat Constant Volume Application with Puron® Refrigerant

HVAC Guide Specifications

Size Range:

2 to 25 Tons, Nominal Cooling
3 to 75 kW Nominal (Electric Heating)

Carrier Model Numbers:

50PG



(NASA VAFB 840, SD-03, Item: Air Conditioning Unit)

Part 1 — General

1.01 SYSTEM DESCRIPTION

Unit is an outdoor rooftop mounted, electrically controlled heating and cooling unit utilizing fully hermetic scroll compressors with on demand crankcase heaters for cooling duty and electric heat for heating duty. Supply air shall be discharged downward or horizontally, as shown on contract drawings. Units shall be of ultra-high cooling efficiency and utilize environmentally sound Puron (R-410A) refrigerant.

1.02 QUALITY ASSURANCE

- A. Unit shall well exceed ASHRAE 90.1-2001 Energy Efficiency Standards. All units shall be ENERGY STAR® qualified. On 03 to 06 sizes — SEER shall be as high as 15.0. On 06 to 16 sizes — EER shall be as high as 12.7 and on sizes 20 to 28 — EER shall be as high as 11.8.
- B. Unit shall be rated in accordance with ARI Standards 210 (sizes 03-12) and 360 on all other sizes. All units shall be designed in accordance with UL Standard 1995. Units shall be rated in accordance with ARI sound standards, 270 or 370.
- C. Unit shall be designed to conform to ASHRAE 15.
- D. Unit shall be UL and UL, Canada, tested and certified in accordance with ANSI Z21.47 Standards as a total package.
- E. Roof curb shall be designed to conform to NRCA Standards.
- F. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- G. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
- H. Unit shall be manufactured in a facility registered to ISO 9001:2000.
- I. Each unit shall be subjected to a completely automated run testing on the assembly line.

1.03 DELIVERY, STORAGE, AND HANDLING

Unit shall be stored and handled per manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT (STANDARD)

A. General:

The 50PG unit shall be a factory assembled, pretested, single-piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, Puron refrigerant charge (R-410A), and special

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features required prior to field start-up. Outdoor sound ratings on sizes 03-06 shall be as low as 72 dB, on sizes 08 to 16 as low as 80 dB and on sizes 20 to 28 as low as 82 dB.

(NASA VAFB 840, SD-03, Item: Casing, Paragraph 2.1.1.4)

B. Unit Cabinet:

1. Constructed of galvanized steel, bonderized and coated with a pre-painted baked enamel finish on all externally exposed surfaces. Internal surfaces shall be of a primer coated finish.
2. All airstream interior surfaces shall be insulated with a minimum 1/2-in. thick, 1 lb density, foilfaced, cleanable, insulation. Insulation shall be bonded with a thermosetting resin (8 to 12% by weight nominal, phenol formaldehyde typical), and coated with an acrylic or other material that meets the NFPA 90 flame retardance requirements and has an "R" Value of 3.70. Insulation shall also be encapsulated with panel design or tape edges ensuring secure fit.
3. Cabinet panels shall be hinged with integrated non-corrosive hinges. Large hinged access panels with multiple quarter-turn latches and handles are provided, for the filter, compressors, evaporator fan, control box and heat section areas. Each major external hinged access panel shall be double-wall construction and permanently attached to the rooftop unit. Panels shall also include tiebacks.
4. Return air filters shall be accessible through a dedicated hinged access panel and be on a slide out track using standard size filters. Filter shall be standard off the shelf sizes and be the size per cabinet. Capability for 2 or 4 inch filters shall be on all sizes.
5. Holes shall be provided in the base rails (minimum 16 gage) for rigging shackles and level travel and movement during overhead rigging operations.
6. Fork lift slots shall be available from three sides of the unit (end and 2 sides) for 03-16 and two sides of the unit (end and side) for other sizes.
7. Unit shall have a factory-installed internally sloped condensate drain pan, providing a minimum 3/4-in.-14 NPT connection with horizontal drain, to prevent standing water from accumulating. Pan shall be fabricated of high impact polycarbonate material and shall slide out for cleaning and or maintenance on sizes 03-16. An alternate vertical drain (3/4-in. NPT) connection is also available on sizes 03-16. Pan shall be fabricated of epoxy powder coated steel for other sizes. All drain pans conform to ASHRAE 62 self-draining provisions.
8. Unit shall have standard thru-the-bottom power and control wiring connection capability.

(NASA VAFB 840, SD-03, Item: Fans, Paragraph 2.1.1.3)

C. Fans:

1. Indoor blower (evaporator fan):
 - a. Centrifugal supply air blower shall have rubber-isolated, cartridge type, ball bearings (50PG03-16) or pillow-block ball bearings (50PG20-28) and adjustable belt drive.
 - b. Fan wheel shall be made from steel with a corrosion resistant finish. It shall be a dynamically balanced, double-inlet type with forward-curved blades.
 - c. The indoor fan system (blower wheels, motors, belts, and both bearings) shall slide out for easy access.
 - d. Evaporator fan motors shall be continuous operation, open drip-proof. Bearings shall be sealed, permanently lubricated ball-bearing type for longer life and lower maintenance.
 - e. On sizes 03 to 16, fan belt shall be located on opposite side of evaporator coil to prevent damage from broken fan belts. On 20 to 28 sizes a fan belt catch system shall be used.
2. Condenser fans shall be of the direct-driven propeller type, with corrosion-resistant aluminum blades riveted to corrosion-resistant steel supports. They shall be dynamically balanced and discharge air upwards. Condenser-fan motors shall be totally enclosed thermally plated and be of a shaft down design to protect from direct contact from harsh environments.

(NASA VAFB 840, SD-03, Item: Compressors)

D. Compressor(s):

1. Fully hermetic, scroll type with on demand crankcase heaters, internal high-pressure and temperature

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protection.

(NASA VAFB 840, SD-03, Item: Vibration Isolation, Paragraph 2.2.1)

2. Factory mounted on rubber grommets and internally spring mounted for vibration isolation.
3. Be mounted on dedicated mounting plate to ensure secure design and reduced sound levels.

(NASA VAFB 840, SD-03, Item: Cooling Coil, Paragraph 2.1.1.2)

E. Coils:

1. Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
2. Dual-circuit models (08-28) shall have face-split type evaporator coil (circuit no. 1 on bottom).
3. Evaporator and condenser coils shall be single slab, single pass design to facilitate easy coil cleaning. Composite coils or coils that require unit top panels removed shall be unacceptable.
4. Coils shall be leak tested at 170 psig and pressure tested at 1875 psig.
5. Optional Coils:
 - a. Optional pre-coated aluminum-fin coils shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.
 - b. Optional copper-fin coils shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan. All copper construction shall provide protection in moderate coastal environments.
 - c. Optional E-Coated aluminum-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60 deg of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and crosshatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum fins mechanically bonded to copper tubes. E-Coated aluminum-fin coils shall provide protection in industrial and industrial and coastal combined environments.
 - d. Optional E-Coated copper-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60 deg of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be copper fins mechanically bonded to copper tubes with copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to maintain coating integrity and minimize corrosion potential between coil and pan. E-Coated copper-fin coils shall provide protection in severe coastal environments.

F. Heating Section:

1. Heater element open coil resistance wire, nickel-chrome alloy, 0.29 inches inside diameter, strung through ceramic insulators mounted on metal frame. Coil ends are staked and welded to terminal screw slots.
2. Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each.
3. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18 ga galvanized steel) attached to end of heater assembly.

G. Refrigerant Components:

Each refrigerant circuit shall include:

1. Balanced port thermostatic expansion valve (TXV) with removable power element.
2. Refrigerant filter driers with pressure ports.
3. Refrigerant pressure gage port and connections on suction, discharge, and liquid lines.

(NASA VAFB 840, SD-03, Item: Filters, Paragraph 2.1.1.6)

H. Filter Section:

1. Standard filter section shall consist of factory-installed 2-in. thick disposable fiberglass filters and shall be on a dedicated slide-out track to easily facilitate access and replacement.
2. Filter section shall use standard size filters and be a common size within cabinet sizes.
3. Optional MERV-8 pleated filters of commercially available sizes shall be available.
4. Standard 2-in. filter rack shall be field convertible to 4-in. by removing a spacer rack on 03-16 sizes. A 4-in. filter capability shall be available as factory-installed option on the other sizes.

(NASA VAFB 840, SD-03, Item: Controls, Paragraph 2.1.1.5)

I. Controls and Safeties:

1. Unit *ComfortLink*™ controls:
 - a. Scrolling Marquee display.
 - b. CCN network capable.
 - c. Unit control with standard suction pressure transducers and condensing temperature thermistors.
 - d. Shall provide a 5° F temperature difference between cooling and heating set points to meet ASHRAE 90.1 Energy Standard.
 - e. Shall provide and display a current alarm list and an alarm history list.
 - f. Automatic compressor redundancy.
 - g. Service run test capability.
 - h. Shall accept input from a CO2 sensor (both indoor and outdoor).
 - i. Configurable alarm light shall be provided which activates when certain types of alarms occur.
 - j. Compressor minimum run time (3 minutes) and minimum off time (5 minutes) are provided.
 - k. Service diagnostic mode.
 - l. Economizer control (optional).
 - m. Multiple capacity stages (on size 08-28 units only).
 - n. Unit shall be complete with self-contained low-voltage control circuit.
 - o. Unit shall have 0° F low ambient cooling operation.
2. Safeties:
 - a. Unit shall incorporate a solid-state compressor lockout which provides optional reset capability at the space thermostat, should any of the following safety devices trip and shut off compressor:
 - 1) Compressor lockout protection provided for either internal or external overload.
 - 2) Low-pressure protection.
 - 3) Freeze protection (evaporator coil).
 - 4) High-pressure protection (high pressure switch or internal).
 - 5) Compressor reverse rotation protection.
 - 6) Loss of charge protection.
 - 7) Start assist on single-phase units.
 - b. Supply-air sensor shall be located in the unit and detect both heating and cooling operation.

J. Operating Characteristics:

1. Unit shall be capable of starting and running at 125 F ambient outdoor temperature per maximum load criteria of ARI Standard 210 (sizes 03-12) and 360 (sizes 16-28).
2. Unit with *ComfortLink* controls will operate in cooling down to an outdoor ambient temperature of 0° F. Electro-mechanical controls shall operate down to 40 F.

3. Unit shall be provided with fan time delay to prevent cold air delivery in heating mode.

K. Electrical Requirements:

All unit power wiring shall enter unit cabinet at a single location — side or bottom.

NOTE: On 208/230 v units using 75-kW heaters, separate wiring is required.

L. Motors:

1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have line break thermal and current overload protection.
2. Evaporator-fan motor shall have permanently lubricated, sealed bearings and inherent automatic- reset thermal overload protection or manual reset calibrated circuit breakers. Evaporator motors are designed specifically for Carrier and do not have conventional horsepower (hp) ratings listed on the motor nameplate. Motors are designed and qualified in the "air-over" location downstream of the cooling coil and carry a maximum continuous bhp rating that is the maximum application bhp rating for the motor; no "safety factors" above that rating may be applied.
3. All evaporator fan motors 5 hp and larger shall meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT), effective October 24, 1997.
4. Totally enclosed condenser-fan motor shall have permanently lubricated, sealed bearings, and inherent automatic-reset thermal overload protection.

M. Special Features:

Certain features are not applicable when the features designed * are specified. For assistance in amending the specifications, contact your local Carrier Sales Office.

* 1. Full Perimeter Roof Curbs (Horizontal and Vertical):

- a. Formed of 14-gage galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight. Shall be interlocking design.
- b. Permits installing and securing ductwork to curb prior to mounting unit on the curb. Field assembly required.
- c. Shall be available in both 14-in. and 24-in. height.

* 2. Adapter Roof Curb:

Shall be available for fit up on previously installed Carrier DJ, TJ, LJ, TF, HJ, TM roof curbs (sizes 03-14).

* 3. Integrated Economizer:

- a. Tilt-out economizer (16-28 slide out) shall be furnished and installed complete with outside-air dampers and controls.
- b. Low-leakage, opposing, gear-driven dampers with UL approved gears.
- c. Capable of introducing up to 100% outdoor air for minimum ventilation as well as free cooling.
- d. Damper actuator shall be electronic 4 to 20 mA or 2 to 10 vdc fully modulating design.
- e. Economizer outdoor hood shall be prepainted and fully assembled on sizes 03-16. Economizer outdoor hood requires field assembly on other sizes.
- f. Economizer shall be available for both field or factory installation.

* 4. Two-Position Motorized Outdoor Air Damper:

- a. The damper shall admit up to 50% outdoor air. Spring return damper closes when unit is off.
- b. The package shall include a multiple-blade damper and motor.
- c. Shall be available as factory-installed option and field-installed accessory.

* 5. Manual Outdoor Air Damper:

- a. The damper shall admit up to 33% outdoor air.
- b. Shall include hood, damper plate, and screen (sizes 03-16) or cleanable aluminum filter (sizes 20-28).
- c. Shall be available as factory-installed option and field-installed accessory.

* 6. Barometric Relief Damper Package:

- a. Package shall include damper, seals, hardware, and hoods to relieve excess internal pressure.
- b. Integrated barometric relief capabilities on economizer shall be available on sizes 03-16.
- c. Damper shall close due to gravity upon unit shutdown.

* 7. Power Exhaust:

- a. For 03-16 sizes, package shall include two (2) propeller exhaust fans, 0.25 Hp (03-07)/0.5 Hp (08-16) 208-230 v, 460 v direct-drive motor on each, and damper for units with economizer to control overpressurization of building. Single-stage control.
- b. For 20-28 sizes, package shall include two (2) centrifugal exhaust fans, 1 Hp 208-230, 460 v (factory-wired for 460 v) three-speed direct drive motor on each, and damper for units with economizer to control over-pressurization of building. Two-stage exhaust capability through *ComfortLink™* control shall be

- available.
- c. Power exhaust shall fit on both vertical and horizontal configured unit.
- d. Power exhaust shall be available for both field or factory installation.
- 8. Single Enthalpy Sensor:
The enthalpy sensor shall provide economizer control based on outdoor air enthalpy. The economizer control shall include logic to calculate the wet bulb and dry bulb temperatures of the outdoor air.
- 9. Differential Enthalpy Sensor:
 - a. For use with economizer only.
 - b. Capable of comparing heat content (temperature and humidity) of outdoor air and indoor air and controlling economizer cut-in point at the most economical level.
- 10. Convenience Outlet:
 - a. Optional factory-installed powered convenience outlet shall be internally mounted with an externally accessible 115-v, 2 plug female receptacle with hinged cover. Shall include 15 amp GFI with independent fuse protection and service receptacle disconnect. The convenience outlet is powered from the line side of the disconnect or circuit breaker with a factory-installed step down transformer, therefore it will not be affected by the position of the disconnect or circuit breaker.
 - b. Optional factory-installed non-powered convenience outlet shall be internally mounted with an externally accessible 115-v, 2 plug female receptacles with hinged cover. There is no step-down transformer installed from the factory.
- *11. HACR Circuit Breaker:
Shall be factory-installed, internally mounted, NEC and UL approved. HACR breaker shall provide unit power shutoff. Shall be accessible from outside the unit and shall provide power off lockout capability.
- 12. CO₂ Sensor:
The duct-mounted or wall-mounted CO₂ sensor shall have the ability to monitor CO₂ levels and relay information to the controller. The controller will use CO₂ level information to modulate the economizer and provide demand control ventilation. The sensor shall be available as field or factory-installed.
- 13. Return Air/Supply Air Smoke Detector:
The smoke detector shall send input to the controller to shut down the unit in case smoke is detected. The smoke detector shall be factory installed in the return air section or shall be available as a field-installed accessory.
- 14. Filter Status:
The filter status switch shall be a pressure switch and will indicate a dirty filter. The switch shall be available as field or factory-installed.
- 15. Fan Status:
The fan status switch shall be a pressure switch and will indicate indoor fan operation. The switch shall be available as field or factory-installed.
- *16. MERV-8 Pleated Return Air Filters:
The filters shall be MERV-8 efficient. The filters shall be 2-in., pleated filters.
- 17. Four-in. Return Air Filter Capability:
 - a. The unit shall be capable of accepting field-supplied 4-in. filters by removing a spacer rack on 03-16 sizes standard units.
 - b. The unit with factory-installed option of 4-in. filter capability (20-28) shall be capable of accepting field-supplied 4-in. filters by removal of the factory-supplied 2-in. filters and filter retainer.
- *18. Low Range Fan Performance Motor/Drive:
This motor/drive option shall provide low range motor and drive capability to enhance evaporator fan performance.
- *19. Mid-Low Fan Performance Motor/Drive (16-28 sizes):
This motor/drive shall provide low to medium motor and drive capability to enhance evaporator fan performance.
- *20. Mid-High Fan Performance Motor/Drive (20-28 sizes):
This motor/drive option shall provide medium to high motor and drive capability to enhance evaporator fan performance.
- *21. High Fan Performance Motor/Drive:
This motor/drive offering shall provide high range motor and drive capability to enhance evaporator fan performance.
- 22. Hail Guard, Condenser Coil Grille:

Shall protect the condenser coil from hail, flying debris, and damage by large objects without increasing unit clearances.

23. Horizontal Kit:

- a. Horizontal kit shall contain all the necessary hardware to convert a vertical airflow unit to a horizontal airflow unit (16-28 sizes).
- b. The unit shall also be available as a horizontal airflow unit directly from the factory.

24. Phase Loss Protection (3 phase units only):

Shall provide unit shutdown when an electrical phase loss is detected — automatic reset type.

25. Roof Curb Burglar Bar:

Shall be 1/2-in. diameter rod with 9-in. on center design grid pattern. Shall mount in roof curb openings.

*26. Electronic Programmable Thermostat:

Capable of using deluxe full-featured electronic thermostat.

*27. Thermostats and Subbases:

To provide staged heating and cooling in addition to automatic (or manual) changeover and fan control.

*28. Electric Resistance Heater Package:

- a. Fully assembled for installation. The packages are designed in accordance with UL safety standards 1995 and listed by ETL. Heater construction approved by UL 5306.
- b. Single point kits available for each heater when required (sizes 03-14).

29. Unit-Mounted, Non-Fused Disconnect Switch:

Switch shall be factory-installed, internally mounted. NEC and UL approved non-fused switch shall provide unit power shutoff. Switch shall be accessible from outside the unit and shall provide power off lockout capability.

*30. Humidi-MiZer™ Adaptive Dehumidification System:

- a. The Humidi-MiZer dehumidification system shall be factory-installed in the 50PG03-28 rooftop units, and shall provide greater dehumidification of the occupied space by two modes of dehumidification operations beside its normal design cooling mode:
 - 1) Subcooling mode further subcools the hot liquid refrigerant leaving the condenser coil when both temperature and humidity in the space are not satisfied.
 - 2) Hot gas reheat mode shall mix a portion of the hot gas from the discharge of the compressor with the hot liquid refrigerant leaving the condenser coil to create a two-phase heat transfer in the system, resulting in a neutral leaving-air temperature when only humidity in the space is not satisfied.
- b. The system shall consist of a subcooling/reheat dehumidification coil located downstream of the standard evaporator coil. This dehumidification coil is a single-row coil on 50PG03-16 units. This dehumidification coil is a two-row coil on 50PG20-28 units.
- c. The system shall include crankcase heater(s) for the scroll compressor(s).
- d. The system shall include a low outdoor air temperature switch to lock out both subcooling and hot gas reheat mode when the outdoor-air temperature is below 40 F.
- e. The system shall include a Motormaster® low ambient control to ensure the normal design cooling mode capable of down to 0° F low ambient operation.
- f. The system shall include a low-pressure switch on the suction line to ensure low pressure start-up of hot gas reheat mode at lower outdoor temperature condition.
- g. The system operation may be controlled by a field-installed, wall-mounted humidistat. The dehumidification circuit will then operate only when needed. Field connections for the humidistat are made in the low-voltage compartment of the unit control box. The sensor can be set for any level between 55% and 80% relative humidity.
- h. The system shall include a thermostatic expansion valve (TXV) to ensure a positive superheat condition.
- i. For units with two or three compressors (sizes 08-28), depending on the conditions required to maintain the space set points, one or all the compressors can operate in subcooling mode, one compressor could operate in subcooling mode while the other(s) operate in hot gas reheat mode, or one or all the compressors can operate in hot gas reheat mode.

Unit Feature Sheet for A

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Prepared By:

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PACKAGED ROOFTOP ELECTRIC COOLING UNITS

2, 3, 4, 5, 6, 7.5, 8.5, 10, 12.5, 15, 18, 20, 25 TONS



CENTURION SERIES

50PG units are single piece packaged ultra high efficiency electric cooling with optional electric heat rooftops. They provide industry leading operating efficiencies, ease of maintenance, ease of installation, and reliability. Units come pre-wired and pre-charged with PURON (R401A) environmentally friendly refrigerant at the factory. Units are factory tested in both heating and cooling modes. Units are rated in accordance with ARI Standard 210 (03-06 sizes) and 360 (07-28 sizes). Tested in accordance with UL Standard 1995 and listed with UL and UL Canada.

Approved and certified by:



Certified to ISO 9001:2000

STANDARD WARRANTY:

- 5-year electric heater
- 5-year compressor
- 1-year parts
- Many optional upgrades also available

STANDARD FEATURES INCLUDE:

- Puron (R-410A) HFC refrigerant
- SEER's up to 15.0, EER's up to 12.7, IPLV's up to 13.3
- ARI certified outdoor sound levels as low as 72 db
- Scroll compressors with crankcase heaters, internal line break overload and high-pressure protection
- Single compressors, single stage cooling on 03 - 07 models
- Dual compressors, dual stage cooling on 08 - 28 models
- TXV refrigerant metering system on each circuit
- High Pressure, Low Pressure/Loss of charge, and Freeze protection.
- Solid core liquid line filter drier on each circuit.
- Ambient cooling operation from 0 F up to 125 F (DDC controls) and from 40 F up to 125 F (Electro-mechanical controls)
- Foil faced insulation throughout entire unit
- Pre-painted exterior panels and primer-coated interior panels tested to 500 hours ASTM B117 (scribed specimen) salt spray protection
- Internally sloped condensate pan conforms to ASHRAE 62 standards
- High performance belt drive indoor fan assemblies
- Internally protected, shaft down totally enclosed condenser motors
- 2 inch filter standard, field convertible to 4 inch capability
- 24 volt control system with resettable circuit breakers
- Models 50PG 03-28 are ENERGY STAR qualified

MAINTENANCE FEATURES:

- Single slab, single pass evaporator and condenser coils with dual side access panels facilitate easy cleaning for maintained high efficiencies
- Hinged access doors with, quick turn latches and door retainers
- Slide out Indoor fan assembly for added service convenience
- Dedicated, fully insulated compressor compartment
- Slide out condensate pan (03-16 models)
- Permanently lubricated evaporator and condenser motors

INSTALLATION FEATURES:

- Thru the bottom and side electrical connection capabilities
- Weather tight thru the bottom access plate
- Single point electrical and gas connections
- Return and supply duct fits between 24" on center joist (03-12 models)
- Field convertible from vertical to horizontal airflow (03-16 models)
- Single piece outdoor air hoods
- Full perimeter baserail with built-in rigging adapters and fork truck slots

FACTORY INSTALLED OPTIONS INCLUDE:

- ComfortLINK Direct Digital Controls (DDC)
- Exclusive Humidi-MZero adaptive dehumidification system
- Exclusive EnergyX Energy Recovery module
- Supply and/or return air smoke detectors
- Powered or non-powered 115 volt convenience outlet
- Non-fused disconnect switch or circuit breaker (HACR)
- Dry bulb or enthalpy economizer
- Manual outdoor air damper
- Two position motorized outdoor damper
- Barometric relief damper
- Power Exhaust
- Condenser coil guard
- MERV-8 Pleated filter upgrade
- CO2 sensor
- Fan status and filter status switches
- Side-by-side horizontal ducts (sizes 20-28. Std all other models)
- High static indoor fan and drive systems
- Phase loss and compressor reverse rotation protection
- Corrosion resistant options for evaporator and condenser coils
- Electric heaters

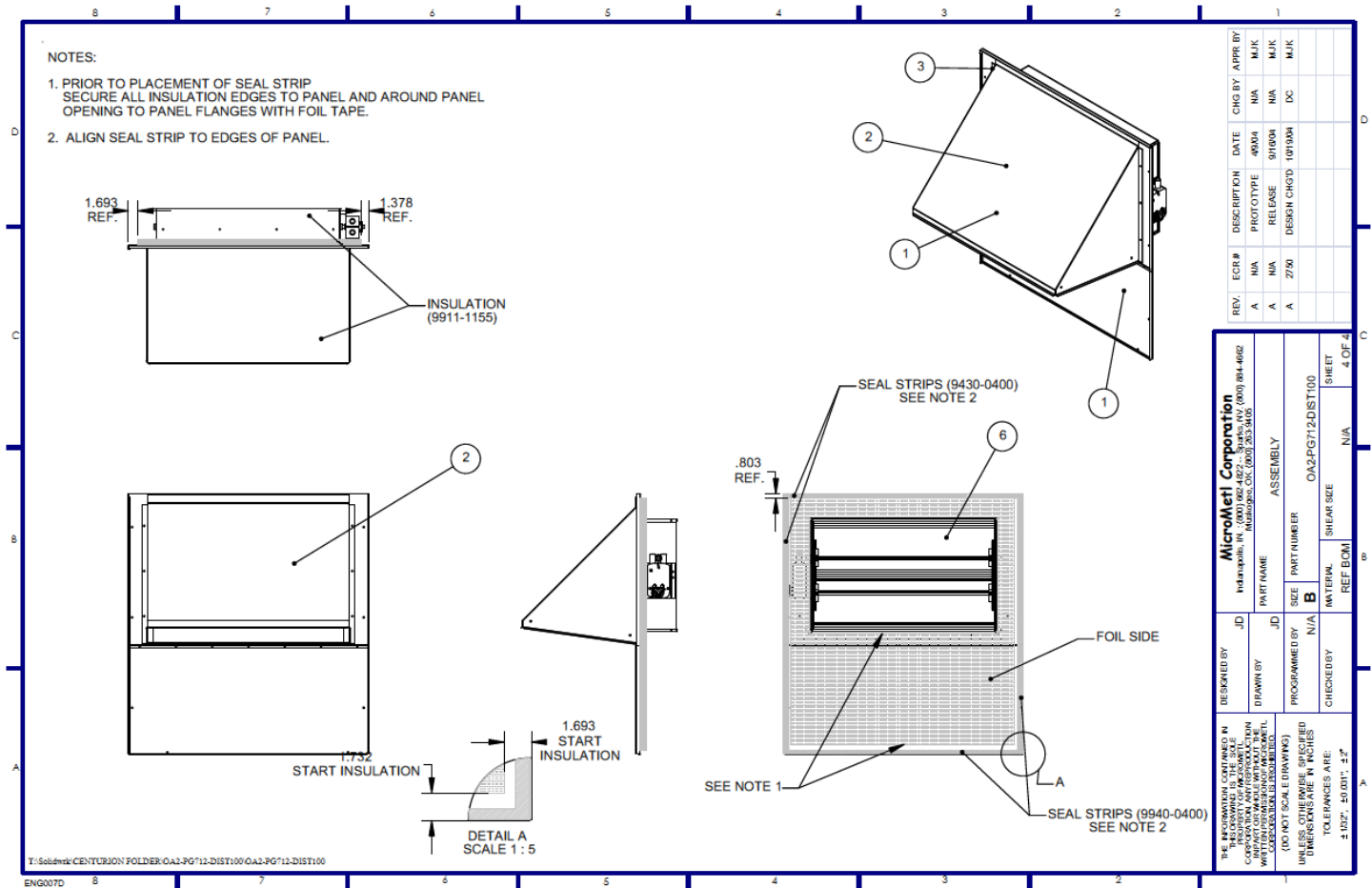
For a complete list of options and accessories refer to the Product Data Catalog for this unit.

Spec Sheet for A

Project: BLDG 840
Prepared By:

05/22/2011
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Economizer Hood

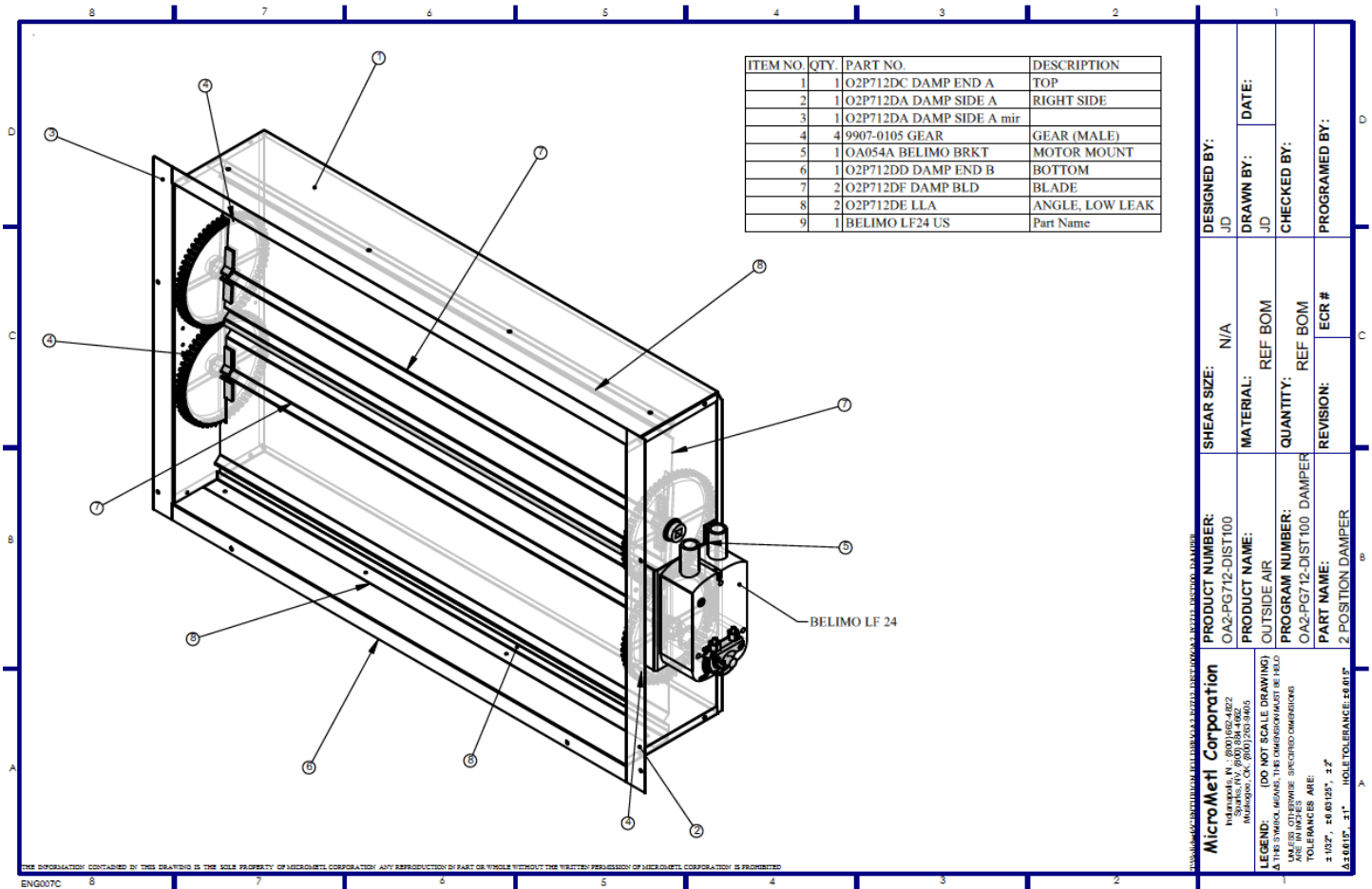


Spec Sheet for A

Project: BLDG 840
Prepared By:

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Economizer Dampers



Spec Sheet for A

Project: BLDG 840
Prepared By:

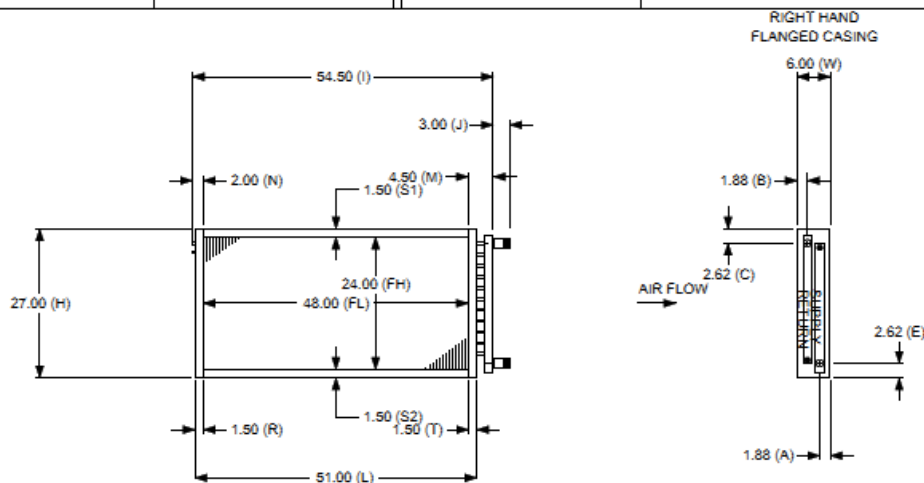
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Heating Coil – HC-3

Item	Coils Per Bank	FA SQ FT	Air Flow ft ³ /min	Face Vel. ft/min	Ent Air DB/WB °F	Lvg Air DB/WB °F	Capacity Total MBH	APD "H ₂ O	Fluid Type	Fluid Temp. Ent/Lvg °F	FPD FT H ₂ O	Fluid Vel	Fluid Flow gal/min	Model Number	FHxFL IN
HC-3	1	8.00	S- 3,200	400.0	37.00	75.34	133.1	.04	Water	180.0/150.1	.37	1.21	9.10	5MH1001A	24.00 x 48.00

		MODEL NUMBER							
ITEM	QTY	TYPE	FPI	ROWS	FIN	FH (IN)	FL (IN)	HAND	
HC-3	1	5MH	10	01	A	24.00	48.00	Right	

MATERIALS OF CONSTRUCTION		OPTIONS			
Fins	0.0060 Copper	Coating	Electrofin		TurboSpirals
Tubes	0.020 Copper	Casing Type	Flanged		Moisture Eliminator
Casing	304L S/S	Vent & Drain	.50 FPT on Face		Mounting Holes
Conn. Material	Red Brass				Label Kit
Conn. Type	MPT				Drain Headers
Conn. Size	1.500				Tube Ferrules
Weight (LBS)	69.0				



DIMENSIONAL DATA(IN)																	
A	B	C	D	E	F	H	I	J	L	M	N	R	S1	S2	T	W	
1.88	1.88	2.62	.00	2.62	.00	27.00	54.50	3.00	51.00	4.50	2.00	1.50	1.50	1.50	1.50	6.00	

NOTES:

GENERAL NOTES:

1. All dimensions are in (in)
2. Manually verifying dimensions is highly recommended.
3. The supply line should be connected to the lower connection on the leaving air side for counterflow operation.
4. Coils will vent and drain through factory-installed vent and drain fittings when mounted level for horizontal flow.
5. Connection location other than standard could affect vent and drain locations. Consult factory.

Spec Sheet for A

Project: BLDG 840
Prepared By:

05/22/2011
07:36AM

Unit A

Installation Manuals

(NASA VAFB 840, SD-3, Item: Installation Manual, Paragraph 3.1)

Installation Instructions

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves.

Recognize safety information. This is the safety-alert symbol

. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lockout tag. Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate.

WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

Puron (R-410a) refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment.

WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.
2. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

IMPORTANT: Units have high ambient operating limits. If limits are exceeded, the units will automatically lock the compressor out of operation. Manual reset will be required to restart the compressor.

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

INSTALLATION

Step 1 —Plan for Unit Location

Select a location the unit and its support system (curb or other) that provides minimum clearances required for safety, unit performance and service access below, around and above unit as specified in unit drawings. Consider also the effect of adjacent units.

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air. Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to Step 6 — Install External Trap for Condensate Drain for required trap dimensions.

Roof Mount

Check building codes for weight distribution requirements. Unit operating weight is shown in Tables 1 and 2.

Step 2 —Provide Unit Support

Roof Curb

Assemble or install accessory roof curb in accordance with instructions shipped with this accessory. See Fig. 1A and 1B. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be installed to roof curb before unit is set in place. Ductwork must be attached to curb and not to the unit. Curb must be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is $\pm 1/16$ in. per linear ft in any direction. Refer to Accessory Roof Curb Installation Instructions for additional information as required. When accessory roof curb is used, unit may be installed on class A, B, or C roof covering material. Carrier roof curb accessories are for flat roofs or slab mounting.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket with the roof curb as shown in Fig. 1, 2 and 5. Improperly applied gasket can also result in air leaks and poor unit performance. Do not slide unit to position on roof curb.

Alternate Unit Support

When a curb cannot be used, install unit on a noncombustible surface. Support unit with sleepers, using unit curb support area. If sleepers cannot be used, support long sides of unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

Step 3 —Rig and Place Unit

Inspect unit for transportation damage. See Tables 1 and 2 for physical data. File any claim with transportation agency.

WARNING

PROPERTY DAMAGE HAZARD

Failure to follow this warning could result in personal injury, death and property damage.

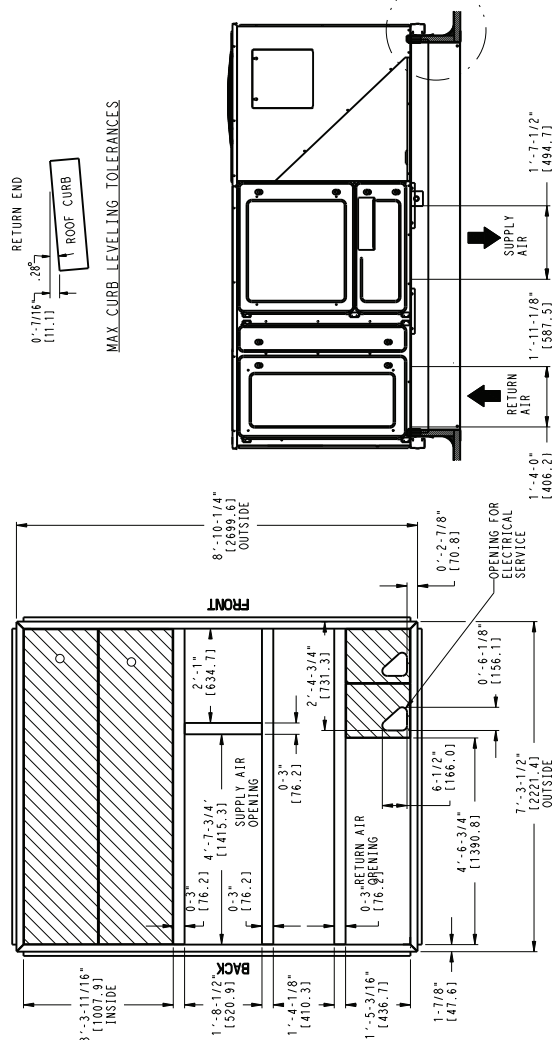
All panels must be in place when rigging and lifting.

Do not drop unit; keep upright. Use wooden top skid or spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit rail as a reference; leveling tolerance is $\pm 1/16$ in. per linear ft in any direction. Unit rigging weight is shown in Fig. 5.

Rigging holes are provided in the unit base rails as shown in Fig. 5. Refer to rigging instructions on unit. See Fig. 3 and 4 for panel and filter locations.

After unit is in position, remove top crating and polyethylene sheet.

UNIT SIZE 50PG	"A"	ROOF CURB ACCESSORY
16	1'-2" [356] 2'-0" [610]	CRFRCURB034A00 CRFRCURB035A00



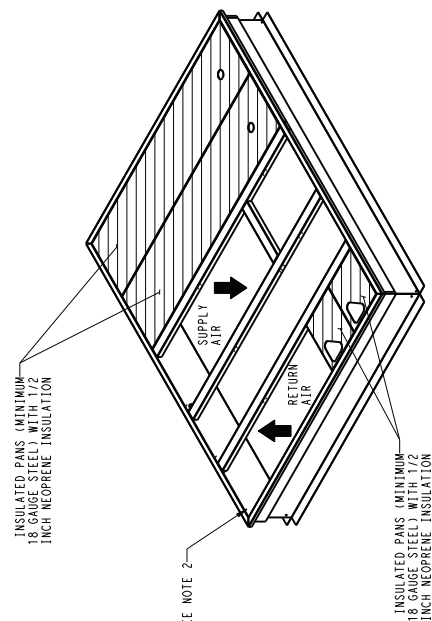
MAX CURB LEVELING TOLERANCES

YPICAL 4 SIDES

↑
DIRECTION OF AIR FLOW

NOTES:

- 1 ROOF CURB ACCESSORY IS SHIPPED UNASSEMBLED.
- 2 BOLT HEADS TO BE ON INSIDE OF FLANGE.
- 3 CLEARANCE IS (111) 0-0.716" TYP ALL CORNERS.
- 4 DIMENSIONS IN () ARE IN MILLIMETERS.
- 5 ROOF CURB IS GALVANIZED STEEL.
- 6 ATTACH DUCTWORK TO CURB (FLANGES ON DUCT REST ON CURB).
- 7 SERVICE CLEARANCE 4 ft ON EACH SIDE



SEE NOTE 2-

INSULATED PANS (MINIMUM—
18 GAUGE STEEL) WITH 1/2
INCH NEOPRENE INSULATION

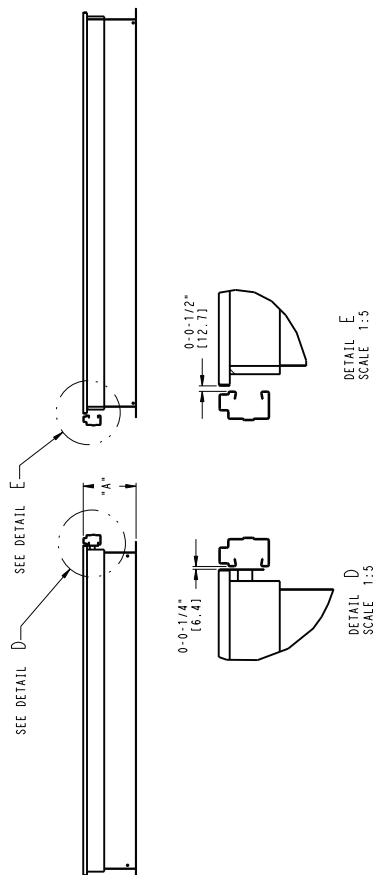


Fig. 2 – Roof Curb Details (50PG16)

NOTES:

1. DIMENSIONS IN [] ARE IN MILLIMETERS.
2. CENTER OF GRAVITY.
3. DIRECTION OF AIR FLOW.
4. ON VERTICAL DISCHARGE UNITS, DUCTWORK TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. FOR HORIZONTAL DISCHARGE UNITS, FIELD SUPPLIED FLANGES SHOULD BE ATTACHED TO HORIZONTAL DISCHARGE OPENINGS, AND ALL DUCTWORK SHOULD BE ATTACHED TO THE FLANGES.
5. MINIMUM CLEARANCE (LOCAL CODES OR JURISDICTION MAY PREVAIL):
 - a. VERTICAL DISCHARGE UNITS, CLEARANCE TO COMBUSTIBLE FOR FIRST 2' OF UNIT SHALL BE 1'.
 - b. BOTTOM OF UNIT TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 1 INCH.
 - c. BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 60 INCHES PROPER AIR FLOW, 36 INCHES. ONE SIDE 12 INCHES THE OTHER, THE SIDE GETTING THE GREATER CLEARANCE IS OPTIONAL.
 - d. OVERHEAD, 60 INCHES TO ASSURE PROPER CONDENSER FAN OPERATION.
 - e. BETWEEN UNITS, CONTROL BOX SIDE, 42 IN., PER NEC.
 - f. BETWEEN UNIT AND UNGROUNDED SURFACES, CONTROL BOX SIDE, 36 IN., PER NEC.
 - g. BETWEEN UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, CONTROL BOX SIDE, 42 IN., PER NEC.
 - h. HORIZONTAL SUPPLY AND RETURN END, 0 INCHES.
6. WITH THE EXCEPTION OF THE CLEARANCE FOR THE CONDENSER COIL, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
7. UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B, OR C ROOF COVERING MATERIAL IF SET ON BASE RAIL.
8. THE VERTICAL CENTER OF GRAVITY IS 1'-6" (457) UP FROM THE BOTTOM OF THE BASE RAIL.

UNIT	STD. WEIGHT (LB.)	UNIT WEIGHT (KG.)	CORNER WEIGHT (A) (LB.)	CORNER WEIGHT (B) (KG.)	CORNER WEIGHT (C) (LB.)	CORNER WEIGHT (D) (KG.)
50PG08	1098	498	243	110	214	97
50PG09	1105	501	244	111	215	98
50PG12	1199	544	265	120	234	106
50PG14	1310	594	290	131	235	116
					358	163
					407	185

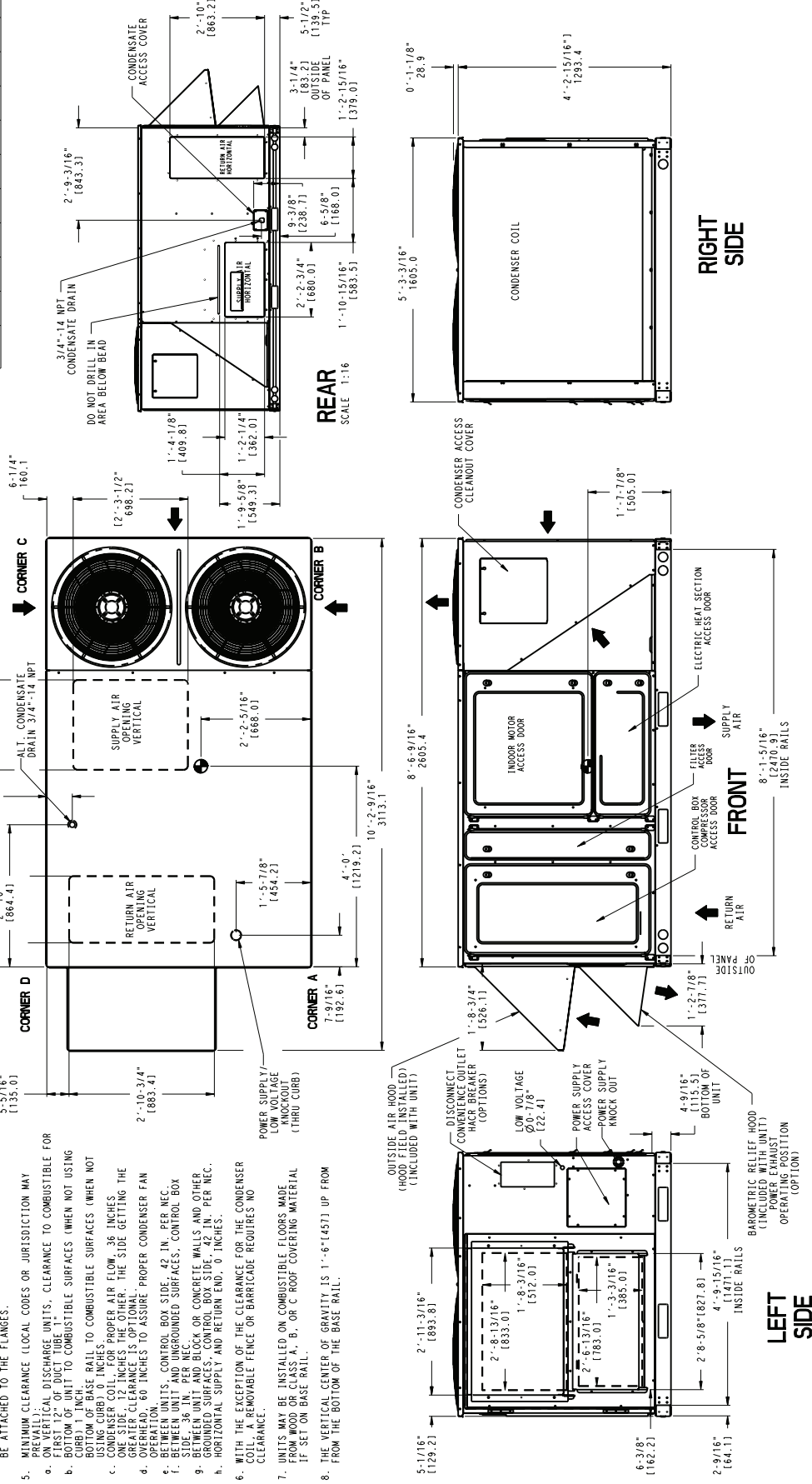


Fig. 3 – Base Unit Dimensions (50PG08-14)

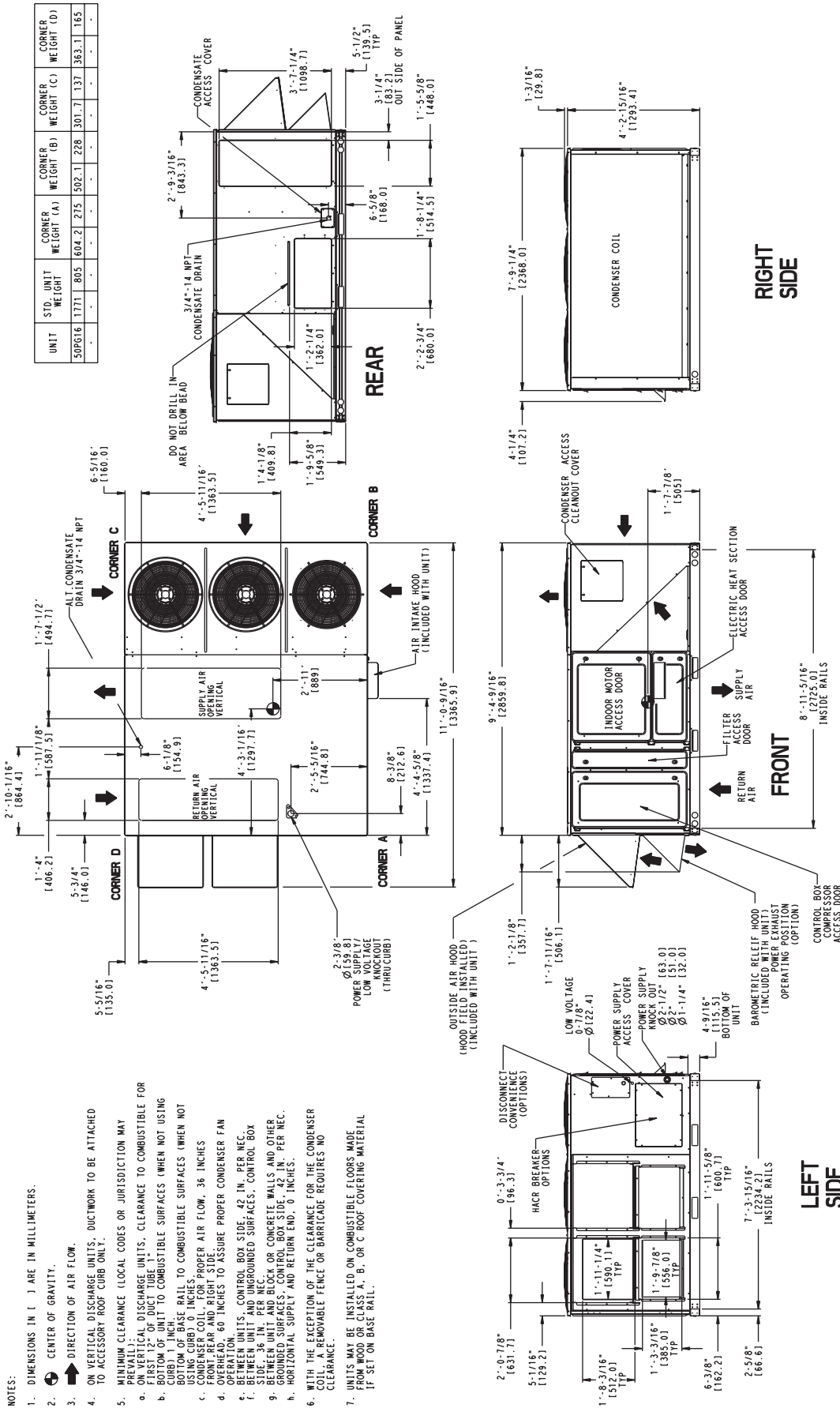
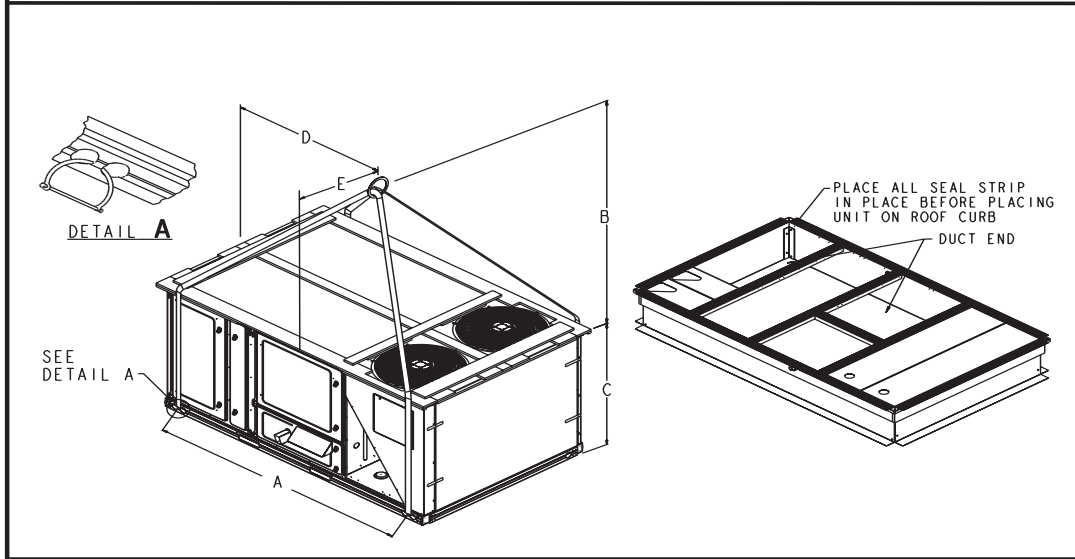


Fig. 4 – Base Unit Dimensions (50PG16)

⚠ CAUTION - NOTICE TO RIGGERS:
ACCESS PANEL MUST BE IN PLACE WHEN RIGGING.

Hook rigging shackles through holes in base rail, as shown in Detail A. Holes in base rails are centered around the unit center of gravity. Use wooden top skid, when rigging, to prevent rigging straps from damaging unit.



UNIT SIZE	A		B		C		D		E		MAX. WEIGHT	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lb	kg
08-14	90.4	2296	36-54	914-1371	52.4	1331	48.0	1219	26.5	668	1572	713
16	100.4	2550	36-54	914-1371	52.4	1331	51.0	1245	35.0	889	1895	861

Fig. 5 – 50PG Rigging Label

C06253

50PG08-16

Table 1—Physical Data (50PG08-14)

BASE UNIT 50PG		08	09	12	14
NOMINAL CAPACITY (Tons)		7.5	8.5	10	12.5
OPERATING WEIGHT (lb)					
Unit*		1098	1105	1199	1310
Economizer					
Vertical		57	57	57	57
Horizontal		59	59	59	59
Roof Curb					
14-in.		180	180	180	180
24-in.		268	268	268	268
COMPRESSOR		Fully Hermetic Scroll			
Quantity		2	2	2	2
Oil Type Sys A		Copeland 3MA	Copeland 3MA	Copeland 3MA	Copeland 3MA
Sys B		Copeland 3MA	Copeland 3MA	Copeland 3MA	Copeland 3MA
Number of Refrigerant Circuits		2	2	2	2
Oil (oz) Sys A		42	42	66	56
Sys B		42	42	66	56
REFRIGERANT TYPE		R-410A (Puron® Refrigerant)			
Expansion Device		TXV	TXV	TXV	TXV
Operating Charge (lb) Sys A		11.8	11.3	13.7	17.2
Sys B		11.8	11.3	13.7	17.2
Operating Charge Total All Systems (lb)		23.5	22.6	27.4	34.4
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins, Face Split			
Condenser A (Outer)					
Rows...Fins/in.		2...17	2...17	2...17	3...17
Face Area (sq ft)		17.4	17.4	17.4	17.4
Condenser B (Inner)					
Rows...Fins/in.		2...17	2...17	2...17	3...17
Face Area (sq ft)		17.4	17.4	17.4	17.4
CONDENSER FAN		Propeller			
Quantity...Diameter (in.)		2...24	2...24	2...24	2...24
Nominal Cfm (Total, all fans)		7204	7204	8341	7300
Motor Hp		1/4	1/4	1/3	1/3
Nominal Rpm — High Speed		1100	1100	1100	1100
Nominal Rpm — Low Speed		900	900	900	900
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split			
Rows...Fins/in.		3...15	3...15	4...15	4...15
Face Area (sq ft)		14.9	14.9	14.9	14.9
EVAPORATOR FAN		Centrifugal Type, Belt Drive			
Quantity...Size (in.)					
Low		1...15 x 15	1...15 x 15	1...15 x 15	1...15 x 15
High		1...15 x 15	1...15 x 15	1...15 x 15	1...15 x 15
Type Drive					
Low		Belt	Belt	Belt	Belt
High		Belt	Belt	Belt	Belt
Nominal Cfm		3000	3400	4000	5000
Maximum Continuous Bhp					
Low		2.40	2.40	3.10	3.70
High		3.10	3.70	3.70	5.25
Motor Nominal Rpm		1725	1725	1725	1725
Motor Frame Size					
Low		56Y	56Y	56Y	56Y
High		56Y	56Y	56Y	56Y
Fan Rpm Range					
Low		568-771	568-771	690-893	690-893
High		812-1015	812-1015	852-1055	852-1055
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Fan Rpm		1600	1600	1600	1600
Motor Pulley Pitch Diameter Range (in.)					
Low		2.8-3.8	2.8-3.8	3.4-4.4	3.4-4.4
High		4.0-5.0	4.0-5.0	4.6-5.6	4.6-5.6
Fan Pulley Pitch Diameter					
Low		8.5	8.5	8.5	8.5
High		8.5	8.5	8.5	8.5
Nominal Motor Shaft Diameter (in.)					
Low		5/8	5/8	7/8	7/8
High		7/8	7/8	7/8	7/8
Belt...Pitch Length (in.)					
Low		63.3	63.3	63.3	63.3
High		65.3	65.3	65.3	65.3
Belt...Type					
Low		AX	AX	AX	AX
High		AX	AX	AX	AX
Pulley Center Line Distance Min. (in.)					
Low		21.0	21.0	21.0	21.0
High		21.0	21.0	21.0	21.0
Pulley Center Line Distance Max. (in.)					
Low		23.4	23.4	23.4	23.4
High		23.4	23.4	23.4	23.4
Speed Change per Full Turn of Movable Pulley Flange (rpm)					
Low		41	41	41	41
High		41	41	41	41
Movable Pulley Maximum Full Turns from Closed Position					
Low		5	5	5	5
High		5	5	5	5
Factory Pulley Setting (rpm)					
Low		568	568	690	690
High		812	812	852	852
Fan Shaft Diameter at Pulley (in.)		1	1	1	1
HIGH-PRESSURE SWITCH (psig)					
Cutout		660 ± 10	660 ± 10	660 ± 10	660 ± 10
Reset (Auto.)		505 ± 20	505 ± 20	505 ± 20	505 ± 20
LOW-PRESSURE SWITCH (psig)					
Cutout		40 ± 7	40 ± 7	40 ± 7	40 ± 7
Reset (Auto.)		80 ± 7	80 ± 7	80 ± 7	80 ± 7
FREEZE PROTECTION THERMOSTAT (F)					
Cutout		30 ± 5	30 ± 5	30 ± 5	30 ± 5
Reset (Auto.)		45 ± 5	45 ± 5	45 ± 5	45 ± 5
RETURN-AIR FILTERS		Throwaway Type			
Quantity...Size (in.)		4...20 x 25 x 2	4...20 x 25 x 2	4...20 x 25 x 2	4...20 x 25 x 2

LEGEND

TXV — Thermostatic Expansion

*Aluminum evaporator/aluminum condenser coil fin material

Table 2—Physical Data (50PG16)

BASE UNIT 50PG		16
NOMINAL CAPACITY (Tons)		15.0
OPERATING WEIGHT (lb)		
Unit*		1771
Economizer		149
Humidi-MiZer™ System		64
Roof Curb		
14-in.		240
24-in.		360
COMPRESSOR		Fully Hermetic Scroll
Quantity		3
Oil Type Sys A		Copeland 3MA
Sys B		Copeland 3MA
Sys C		Copeland 3MA
Number of Refrigerant Circuits		3
Oil (oz) Sys A		66
Sys B		66
Sys C		66
REFRIGERANT TYPE		R-410A (Puron® Refrigerant)
Expansion Device		TXV
Operating Charge (lb) Sys A		13.5
Sys B		15.0
Sys C		15.0
Operating Charge Total All Systems (lb)		43.5
Unit with Humidi-MiZer System		
Operating Charge (lb) Sys A		18.8
Sys B		16.7
Sys C		18.8
Total All Systems (lb)		54.3
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins, Face Split
Condenser A (Outer)		
Rows...Fins/in.		2...17
Face Area (sq ft)		26.6
Condenser B (Inner)		
Rows...Fins/in.		2...17
Face Area (sq ft)		30.2
Humidi-MiZer Coil		Enhanced Copper Tubes, Aluminum Lanced Fins
Rows...Fins/in.		1...17
Face Area (sq ft)		22.2
CONDENSER FAN		Propeller
Quantity...Diameter (in.)		3...24
Nominal Cfm (Total, all fans)		12,500
Motor Hp		1/3
Nominal Rpm		1100
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split 3...15
Rows...Fins/in.		22.2
Face Area (sq ft)		
EVAPORATOR FAN		Centrifugal Type, Belt Drive
Quantity...Size (in.)		
Low		1...15 x 15, 1...12 x 12
Mid-Low		1...15 x 15, 1...12 x 12
High		1...15 x 15, 1...12 x 12
Type Drive		
Low		Belt
Mid-Low		Belt
High		Belt
Nominal Cfm		6000
Maximum Continuous Bhp		
Low		3.7
Mid-Low		5.25
High		7.5
Motor Frame Size		
Low		56
Mid-Low		56
High		S213T
Fan Rpm Range		
Low		710-879
Mid-Low		872-1066
High		1066-1260
Motor Bearing Type		Ball
Motor Pulley Pitch Diameter Min (in.)		
Low		4.2
Mid-Low		4.2
High		5.2
Motor Pulley Pitch Diameter Max (in.)		
Low		5.2
Mid-Low		5.2
High		6.2
Fan Pulley Pitch Diameter		
Low		10.2
Mid-Low		8.5
High		8.5
Nominal Motor Shaft Diameter (in.)		
Low		7/8
Mid-Low		7/8
High		1 3/8
Belt...Pitch Length (in.)		
Low		49.3
Mid-Low		47.8
High		43.8

Table 2 — Physical Data (50PG16) (Cont)

EVAPORATOR FAN (Continued)		
Belt...Type	Low	AX
	Mid-Low	BX
	High	BX
Pulley Center Line Distance Min. (in.)	Low	14.2
	Mid-Low	10.8
	High	8.6
Pulley Center Line Distance Max. (in.)	Low	10.8
	Mid-Low	14.2
	High	12
Speed Change (rpm)	Low	34
	Mid-Low	41
	High	41
Movable Turns	Low	5
	Mid-Low	5
	High	5
Factory Pulley Setting (rpm)	Low	812
	Mid-Low	983
	High	1191
Fan Shaft Diameter at Pulley (in.)		1 ³ / ₁₆
HIGH-PRESSURE SWITCH (psig)		
Cutout		660 ± 10
Reset (Auto.)		505 ± 20
RETURN-AIR FILTERS		Throwaway Type
Quantity...Size (in.)		8...20 x 20 x 2

LEGEND

TXV — Thermostatic Expansion

*Aluminum evaporator/aluminum condenser coil fin material

Installation Onto Curb

The 50PG units are designed to fit on the accessory full perimeter curb. In either case, correct placement of the unit onto the curb is critical to operating performance. To aid in correct positioning, place unit on roof curb to maintain $\frac{1}{4}$ -in. gap between the inside of rail and roof curb on long sides and a $\frac{1}{2}$ -in. gap between the inside of rail and roof curb on both duct and condenser ends. Refer to Fig. 1-4, to assure proper duct opening alignment.

NOTE: Make sure the bottom drain condensate connection plug is tight before installing unit on curb. See Step 6 — Install External Trap for Condensate Drain.



CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Do not slide unit to position when it is sitting on the curb. Curb gasketing material may be damaged and leaks may result.

Slab Mount (Horizontal Units Only)

Provide a level concrete slab that extends a minimum of 6-in. beyond unit cabinet. Install a gravel apron in front of condenser-coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

Step 4 —Field Fabricate Ductwork

On vertical units, secure all ducts to roof curb and building structure. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return-air static pressure (a negative condition) shall not exceed 0.35 in. wg with economizer or 0.45 in. wg without economizer.

Step 5 —Make Unit Duct Connections

Vertical Supply/Return Configuration

Unit is shipped in vertical supply/return configuration. Ductwork openings are shown in Fig. 1-4. Attach the ductwork to the roof curb. Do not attach duct directly to the unit.



WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90-degree turn in the return ductwork between the unit and the conditioned space. If a 90-degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space.

Units with electric heat require a 1-in. clearance for the first 24 in. of ductwork. Outlet grilles must not lie directly below unit discharge.

NOTE: A 90-degree elbow must be provided in the supply ductwork to comply with UL (Underwriters' Laboratories) codes for use with electric heat.

Horizontal Supply/Return Applications (Sizes 08-14 Only)

Unit can be field-converted from vertical supply/return to horizontal supply/return. Remove all screws securing horizontal duct covers to duct panel. Save panels. Apply a bead of RTV around flange of cover (painted side). Install duct covers in the vertical duct openings in the basepan with the insulation side up. Covers will drop into openings and can be secured using field-supplied self-tapping screws. Ductwork can be attached to duct flanges provided on unit. When securing ductwork to unit, do not drill in area below bead or above top edge of duct opening.

NOTE: On the 16 size, an accessory is available (CRHORIZON005AA00) to convert from vertical supply/return to horizontal. Follow instructions provided with kit.

Step 6 —Install External Trap for Condensate Drain

The unit's $\frac{3}{4}$ -in. condensate drain connections are located on the bottom and side of the unit. If the down drain is used, drill a minimum of a $\frac{5}{8}$ -in. diameter hole but not larger than a $\frac{3}{4}$ -in. diameter hole through the drain pan. A dimple of 2 mm in diameter and 1.5 mm deep will be provided in the drain pan to help locate the drill bit and to start the hole. Do not cut through the PVC pipe threads. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications. See Fig. 3 and 4 for locations.

When using the standard side drain connection, make sure the plug (red) in the alternate bottom connection is tight before installing the unit. (See Fig. 8.)

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug (red) from the bottom connection to the side connection. A $\frac{1}{2}$ -in. socket extension can be used to remove the plug. (See Fig. 8.) The piping for the condensate drain and external trap can be completed after the unit is in place.

All units must have an external trap for condensate drainage. Install a trap at least 4-in. deep and protect against freeze-up. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1-in. per 10 ft of run. Do not use a pipe size smaller than the unit connection ($\frac{3}{4}$ -in.). (See Fig. 9 and 10.)

The 50PG units are provided with a removable condensate pan for ease of cleaning. It is recommended that a union be placed between the unit and condensate drainage to ease the removal of the pan during servicing. Adequate clearance should be allowed if removal of condensate pan is required. Allow 64 in. (08-14) or 93-in. (16) between condensate pan access panel and any obstruction for complete removal.

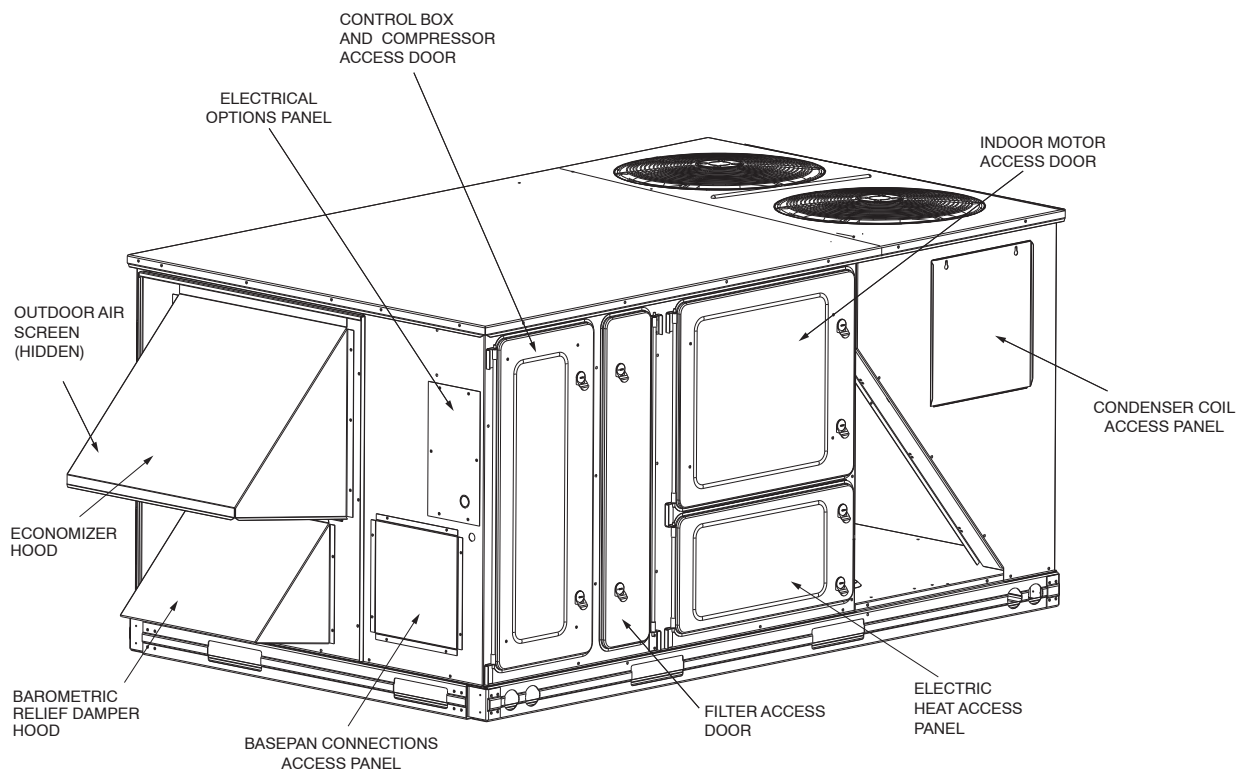


Fig. 6 – Panel and Filter Locations (50PG08-14)

C06315

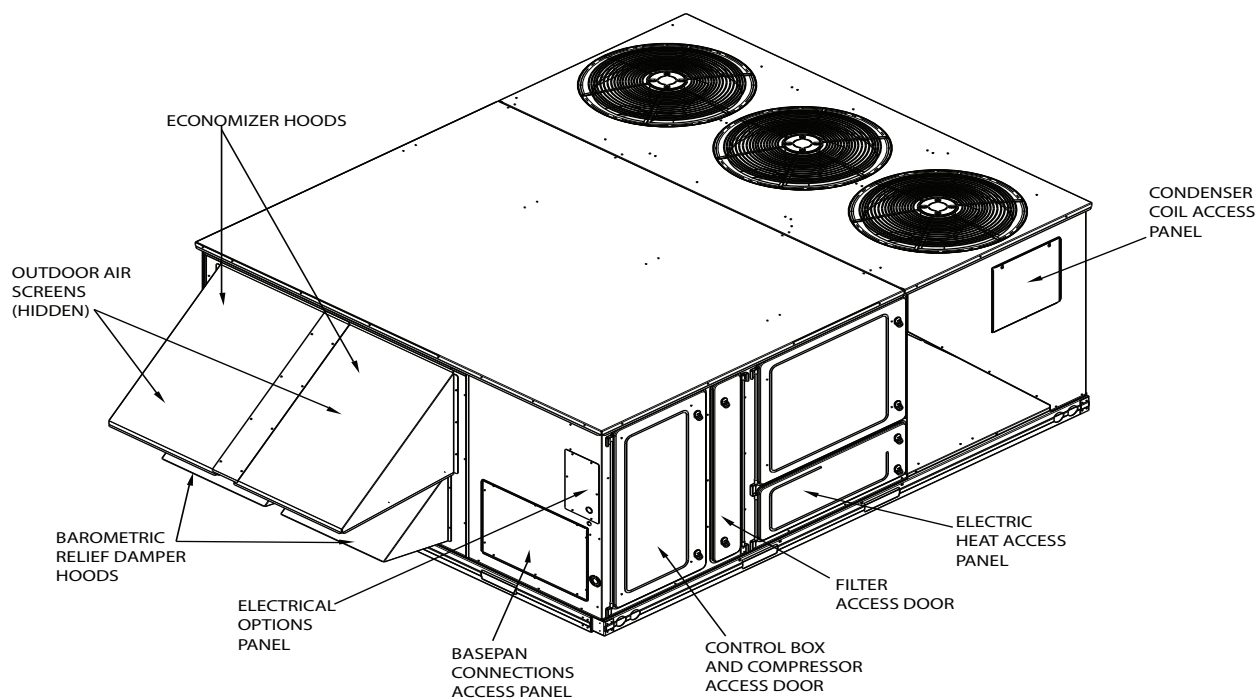


Fig. 7 – Panel and Filter Locations (50PG16)

C06309

Step 7 —Make Electrical Connections

Field Power Supply

All 208/230-v units are factory wired for 230-v power supply. If the 208/230-v unit is to be connected to a 208-v power supply, the transformer must be rewired by moving the black wire with the $\frac{1}{4}$ -in. female quick connect from the 230-volt connection and moving to the 200-volt $\frac{1}{4}$ -in. male terminal on the primary side of the transformer.

Refer to unit label diagram for additional information.

All field wiring must comply with NEC (National Electrical Code) and local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. Leads are provided for field wire connections. Use UL (Underwriters' Laboratories) approved copper/aluminum connector.

INSERT SIDE DRAIN
PLUG FOR DOWN
DRAIN USE.

DRILL 5/8" DIA. (0.625 mm) HOLE
THRU FOR DOWN DRAIN USE.

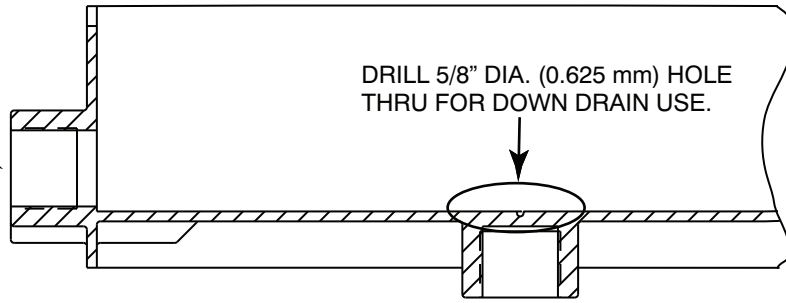
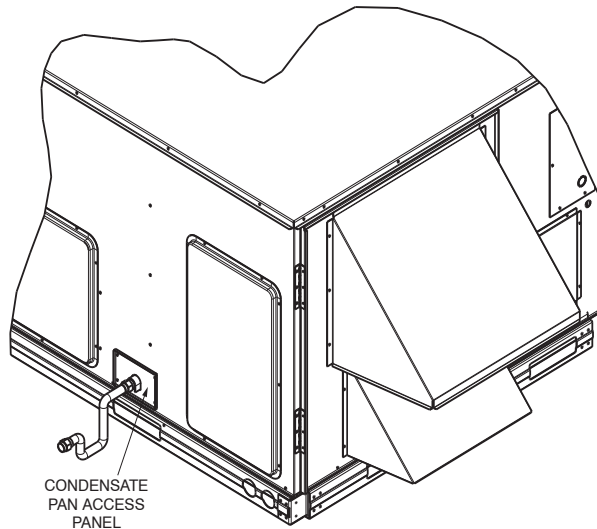


Fig. 8 – Condensate Drain Pan

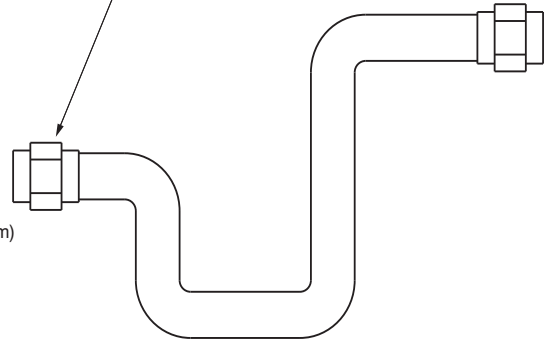
C10321



CONDENSATE
PAN ACCESS
PANEL

OPTIONAL UNIONS
TO ALLOW FOR CONDENSATE
PAN REMOVAL

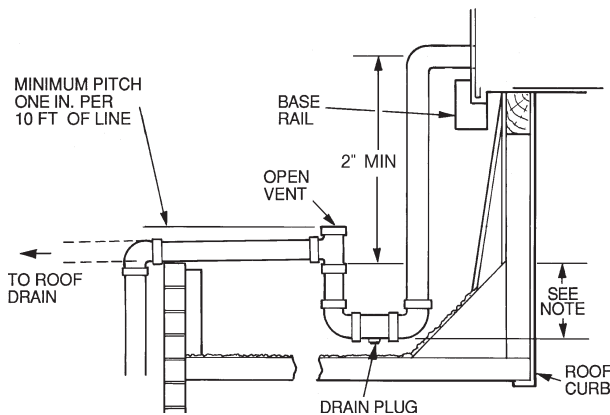
4" (102mm)



50PG08-16

Fig. 9 – External Trap for Condensate Drain

C06234



MINIMUM PITCH
ONE IN. PER
10 FT. OF LINE

BASE RAIL

OPEN VENT

2" MIN

TO ROOF
DRAIN

DRAIN PLUG

SEE
NOTE

ROOF
CURB

NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended.

C06235

Fig. 10 – Condensate Drain Piping Details

When installing units, provide safety disconnect per NEC Article 440 or local codes. For non-fused disconnects, size the disconnect according to the sizing data provided in the electrical data tables.

If a fused disconnect is used, determine the minimum size for the switch based on the disconnect sizing data provided in the electrical data tables and then coordinate the disconnect housing size to accommodate the Maximum Overcurrent Protection (MOCP) device size as marked on the unit informative plate. (See Tables 3 and 4.)

See Fig. 11 for power wiring connection to unit leads and equipment ground.

Route power and ground lines through control box end panel or unit basepan (see Fig. 3 and 4) to connections as shown on unit wiring diagram and Fig. 8. Factory leads may be wired directly to the disconnect.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in damage to the unit.

The correct power phasing is critical to the operation of the scroll compressors. An incorrect phasing will result in an alarm and compressor operation lockout. Should this occur, power phase correction must be made to the incoming power. Damage to compressor could result.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC; ANSI/NFPA (National Fire Protection Association), latest edition, and local electrical codes.

Field wiring must conform to temperature limitations for type “T” wire. All field wiring must comply with NEC and local requirements.

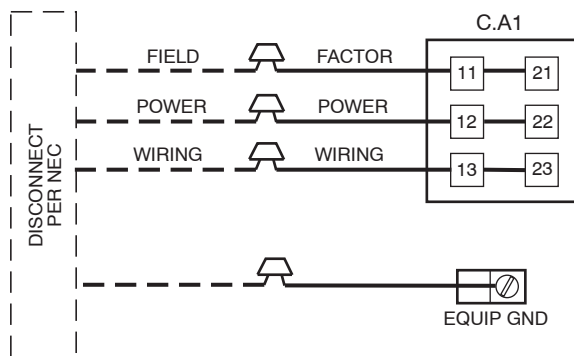
Operating voltage to compressor must be within voltage range indicated on unit nameplate. Voltages between phases must be balanced within 2%.

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components.

Field Control Wiring

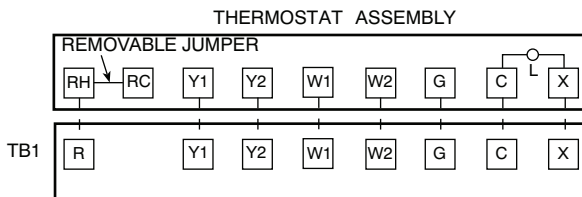
Unit can be controlled with a Carrier-approved accessory thermostat. Install thermostat according to the installation instructions included with accessory. Locate thermostat assembly on a solid interior wall in the conditioned space to sense average temperature.

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through conduit into unit to low-voltage connections as shown on unit label wiring diagram and in Fig. 12.



C06237

Fig. 11 – Field Power Wiring Connections



C06238

Fig. 12 – Field Control Thermostat Wiring

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gauge) insulated wire (35°C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35°C minimum). For over 75 ft, use no. 14 AWG insulated wire (35°C Minimum). All wire larger than no. 18 AWG cannot be directly connected at the thermostat and will require a junction box and splice at the thermostat.

Set heat anticipator settings as follows:

VOLTAGE	STAGE 1 (W1) ON	STAGE 1 AND 2 (W1 AND W2) ON
All	0.2	0.4

Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

Table 3—Electrical Data — Units Without Optional Powered Convenience Outlet

UNIT 50PG	NOMINAL POWER SUPPLY VOLTS-PH-HZ	VOLTAGE RANGE		COMPRESSOR (EA.)		OFM FLA	IFM FLA	POWER EXHAUST FLA	IFM TYPE	ELECTRIC HEAT			POWER SUPPLY		DISCONNECT SIZE		
		MIN	MAX	RLA	LRA					CRHEATER PART NO.	FLA	NOMINAL KW*	MCA	MOCPT	FLA	LRA	
08	208/230-3-60	187	253	13.5	88	1.5	5.2	—	Low	—	—	—/—	38.5/ 38.5	50/ 50	40/ 40	212/212	
										225A00	20.0/23.1	7.5/10.0	38.5/ 38.5	50/ 50	40/ 40	212/212	
										226A00	30.0/34.6	11.3/15.0	44.0/ 49.8	50/ 50	41/ 46	212/212	
										227A00	50.0/57.7	18.8/25.0	69.0/ 78.7	70/ 80	64/ 72	212/212	
										228A00	70.0/80.8	26.3/35.0	94.1/107.5	100/110	87/ 99	212/212	
										229A00	80.0/92.4	30.0/40.0	106.6/122.0	110/125	98/112	212/212	
							7.5	—	High	—	—	—/—	40.8/ 40.8	50/ 50	43/ 43	238/238	
										225A00	20.0/23.1	7.5/10.0	40.8/ 40.8	50/ 50	43/ 43	238/238	
										226A00	30.0/34.6	11.3/15.0	46.9/ 52.7	50/ 60	43/ 48	238/238	
										227A00	50.0/57.7	18.8/25.0	71.9/ 81.5	80/ 90	66/ 75	238/238	
										228A00	70.0/80.8	26.3/35.0	96.9/110.4	100/125	89/102	238/238	
										229A00	80.0/92.4	30.0/40.0	109.4/124.8	110/125	101/115	238/238	
							5.2	—	Low	—	—	—/—	41.5/ 41.5	50/ 50	44/ 44	216/216	
										225A00	20.0/23.1	7.5/10.0	41.5/ 41.5	50/ 50	44/ 44	216/216	
										226A00	30.0/34.6	11.3/15.0	47.8/ 53.6	50/ 60	44/ 49	216/216	
										227A00	50.0/57.7	18.8/25.0	72.8/ 82.4	80/ 90	67/ 76	216/216	
										228A00	70.0/80.8	26.3/35.0	97.8/111.3	100/125	90/102	216/216	
										229A00	80.0/92.4	30.0/40.0	110.3/125.7	125/150	101/116	216/216	
							7.5	—	High	—	—	—/—	43.8/ 43.8	50/ 50	46/ 46	242/242	
										225A00	20.0/23.1	7.5/10.0	43.8/ 43.8	50/ 50	46/ 46	242/242	
										226A00	30.0/34.6	11.3/15.0	50.6/ 56.4	60/ 60	47/ 52	242/242	
										227A00	50.0/57.7	18.8/25.0	75.7/ 85.3	80/ 90	70/ 78	242/242	
										228A00	70.0/80.8	26.3/35.0	100.7/114.2	110/125	93/105	242/242	
										229A00	80.0/92.4	30.0/40.0	113.2/128.6	125/150	104/118	242/242	
	460-3-60	414	506	6.4	39	0.8	2.6	—	Low	—	—	—	18.6	25	20	96	
										232A00	11.5	10.0	18.6	25	20	96	
										233A00	17.3	15.0	24.9	25	23	96	
										234A00	28.9	25.0	39.3	40	36	96	
										235A00	40.4	35.0	53.8	60	49	96	
										236A00	46.2	40.0	61.0	70	56	96	
							3.4	—	High	—	—	—	19.4	25	20	109	
										232A00	11.5	10.0	19.4	25	20	109	
										233A00	17.3	15.0	25.9	30	24	109	
										234A00	28.9	25.0	40.3	45	37	109	
										235A00	40.4	35.0	54.8	60	50	109	
										236A00	46.2	40.0	62.0	70	57	109	
							2.6	—	Low	—	—	—	19.8	25	21	99	
										232A00	11.5	10.0	19.8	25	21	99	
										233A00	17.3	15.0	26.4	30	24	99	
										234A00	28.9	25.0	40.8	45	38	99	
										235A00	40.4	35.0	55.3	60	51	99	
										236A00	46.2	40.0	62.5	70	57	99	
							3.4	—	High	—	—	—	20.6	25	22	112	
										232A00	11.5	10.0	20.6	25	22	112	
										233A00	17.3	15.0	27.4	30	25	112	
										234A00	28.9	25.0	41.8	45	38	112	
										235A00	40.4	35.0	56.3	60	52	112	
										236A00	46.2	40.0	63.5	70	58	112	
	575-3-60	518	632	6.4	30.0	0.8	2.0	—	Low	—	—	—	18.0	20	19	84	
										239A00	13.9	15.0	20.1	20	19	84	
										240A00	23.1	25.0	31.4	35	29	84	
										241A00	32.3	35.0	42.9	45	39	84	
										242A00	37.0	40.0	48.7	50	45	84	
							2.8	—	High	—	—	—	18.8	20	20	102	
										239A00	13.9	15.0	20.8	25	20	102	
										240A00	23.1	25.0	32.4	35	30	102	
										241A00	32.3	35.0	43.9	45	40	102	
										242A00	37.0	40.0	49.7	50	46	102	
							2.8	3.0	Low	—	—	—	18.1	20	19	86	
										239A00	13.9	15.0	23.6	25	22	86	
										240A00	23.1	25.0	35.1	40	32	86	
										241A00	32.3	35.0	46.7	50	43	86	
										242A00	37.0	40.0	52.4	60	48	86	
										—	—	—	18.9	25	20	98	
							2.8		High	239A00	13.9	15.0	24.6	25	23	98	
										240A00	23.1	25.0	36.1	40	33	98	
										241A00	32.3	35.0	47.7	50	44	98	
										242A00	37.0	40.0	53.4	60	49	98	

Table 3 — Electrical Data — Units Without Optional Powered Convenience Outlet (cont)

UNIT 50PG	NOMINAL POWER SUPPLY VOLTS-PH-HZ	VOLTAGE RANGE		COMPRESSOR (EA.)		OFM FLA	IFM FLA	POWER EXHAUST FLA	IFM TYPE	ELECTRIC HEAT			POWER SUPPLY		DISCONNECT SIZE		
		MIN	MAX	RLA	LRA					CRHEATER PART NO.	FLA	NOMINAL KW*	MCA	MOCPT†	FLA	LRA	
09	208/230-3-60	187	253	16.0	91	1.5	5.2	—	Low	—	—	—/—	44.3/ 44.3	60/ 60	46/ 46	218/218	
										225A00	20.0/23.1	7.5/10.0	44.3/ 44.3	60/ 60	46/ 46	218/218	
										226A00	30.0/34.6	11.3/15.0	44.3/ 49.8	60/ 60	46/ 46	218/218	
										227A00	50.0/57.7	18.8/25.0	69.0/ 78.7	70/ 80	64/ 72	218/218	
										228A00	70.0/80.8	26.3/35.0	94.1/107.5	100/110	87/ 99	218/218	
										229A00	80.0/92.4	30.0/40.0	106.6/122.0	110/125	98/112	218/218	
									High	—	—	—/—	49.3/ 49.3	60/ 60	52/ 52	261/261	
										225A00	20.0/23.1	7.5/10.0	49.3/ 49.3	60/ 60	52/ 52	261/261	
										226A00	30.0/34.6	11.3/15.0	50.3/ 56.1	60/ 60	52/ 52	261/261	
										227A00	50.0/57.7	18.8/25.0	75.3/ 84.9	80/ 90	69/ 78	261/261	
										228A00	70.0/80.8	26.3/35.0	100.3/113.8	110/125	92/105	261/261	
										229A00	80.0/92.4	30.0/40.0	112.8/128.2	125/150	104/118	261/261	
								3.0	Low	—	—	—/—	47.3/ 47.3	60/ 60	50/ 50	222/222	
										225A00	20.0/23.1	7.5/10.0	47.3/ 47.3	60/ 60	50/ 50	222/222	
										226A00	30.0/34.6	11.3/15.0	47.8/ 53.6	60/ 60	50/ 50	222/222	
										227A00	50.0/57.7	18.8/25.0	72.8/ 82.4	80/ 90	67/ 76	222/222	
										228A00	70.0/80.8	26.3/35.0	97.8/111.3	100/125	90/102	222/222	
										229A00	80.0/92.4	30.0/40.0	110.3/125.7	125/150	101/116	222/222	
									High	—	—	—/—	52.3/ 52.3	60/ 60	55/ 55	265/265	
										225A00	20.0/23.1	7.5/10.0	52.3/ 52.3	60/ 60	55/ 55	265/265	
										226A00	30.0/34.6	11.3/15.0	54.0/ 59.8	60/ 60	55/ 55	265/265	
										227A00	50.0/57.7	18.8/25.0	79.0/ 88.7	80/ 90	73/ 82	265/265	
										228A00	70.0/80.8	26.3/35.0	104.1/117.5	110/125	96/108	265/265	
										229A00	80.0/92.4	30.0/40.0	116.6/132.0	125/150	107/121	265/265	
	460-3-60	414	506	7.1	46	0.8	2.6	—	Low	—	—	—	20.1	25	21	110	
										232A00	11.5	10.0	20.1	25	21	110	
										233A00	17.3	15.0	24.9	25	23	110	
										234A00	28.9	25.0	39.3	40	36	110	
										235A00	40.4	35.0	53.8	60	49	110	
										236A00	46.2	40.0	61.0	70	56	110	
							4.8		High	—	—	—	22.3	25	24	132	
										232A00	11.5	10.0	22.3	25	24	132	
										233A00	17.3	15.0	27.7	30	25	132	
										234A00	28.9	25.0	42.1	45	39	132	
										235A00	40.4	35.0	56.5	60	52	132	
										236A00	46.2	40.0	63.7	70	59	132	
							2.6	1.2	Low	—	—	—	21.3	25	22	113	
										232A00	11.5	10.0	21.3	25	22	113	
										233A00	17.3	15.0	26.4	30	24	113	
										234A00	28.9	25.0	40.8	45	38	113	
										235A00	40.4	35.0	55.3	60	51	113	
										236A00	46.2	40.0	62.5	70	57	113	
							4.8		High	—	—	—	23.5	30	25	134	
										232A00	11.5	10.0	23.5	30	25	134	
										233A00	17.3	15.0	29.2	30	27	134	
										234A00	28.9	25.0	43.6	45	40	134	
										235A00	40.4	35.0	58.0	60	53	134	
										236A00	46.2	40.0	65.2	70	60	134	
	575-3-60	518	632	5.6	37.0	0.8	2.0	—	Low	—	—	—	16.2	20	17	98	
										239A00	13.9	15.0	20.1	20	18	98	
										240A00	23.1	25.0	31.4	35	29	98	
										241A00	32.3	35.0	42.9	45	39	98	
										242A00	37.0	40.0	48.7	50	45	98	
										—	—	—	17.5	20	19	136	
							3.3		High	239A00	13.9	15.0	21.4	25	20	136	
										240A00	23.1	25.0	33.0	35	30	136	
										241A00	32.3	35.0	45.1	45	41	136	
										242A00	37.0	40.0	50.3	50	46	136	
							2.0	3.0	Low	—	—	—	19.1	25	20	92	
										239A00	13.9	15.0	23.6	25	22	92	
										240A00	23.1	25.0	35.1	40	32	92	
										241A00	32.3	35.0	46.7	50	43	92	
										242A00	37.0	40.0	52.4	60	48	92	
										—	—	—	19.9	25	21	104	
							3.3		High	239A00	13.9	15.0	24.6	25	23	104	
										240A00	23.1	25.0	36.1	40	33	104	
										241A00	32.3	35.0	47.7	50	44	104	
										242A00	37.0	40.0	53.4	60	49	104	

LEGEND

- FLA** – Full Load Amps
- HACR** – Heating, Air Conditioning and Refrigeration
- IFM** – Indoor (Evaporator) Fan Motor
- LRA** – Locked Rotor Amps
- MCA** – Minimum Circuit Amps
- MOCP** – Maximum Overcurrent Protection
- NEC** – National Electrical Code
- OFM** – Outdoor (Condenser) Fan Motor
- RLA** – Rated Load Amps

* Heater capacity (kW) is based on heater voltage of 208 v, 230 v, 480 v, or 600 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

† Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$



Example: Supply voltage is 460-3-60



AB = 224 v

BC = 231 v

AC = 226 v

$$\begin{aligned} \text{Average Voltage} &= \frac{224 + 231 + 226}{3} \\ &= \frac{681}{3} \\ &= 227 \end{aligned}$$

Determine maximum deviation from average voltage.

(AB) 227 – 224 = 3 v

(BC) 231 – 227 = 4 v

(AC) 227 – 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{227} \\ &= 1.76\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Table 3 — Electrical Data — Units Without Optional Powered Convenience Outlet (cont)

UNIT 50PG	NOMINAL POWER SUPPLY VOLTS-PH-HZ	VOLTAGE RANGE		COMPRESSOR (EA.)		OFM FLA	IFM FLA	POWER EXHAUST FLA	IFM TYPE	ELECTRIC HEAT			POWER SUPPLY		DISCONNECT SIZE		
		MIN	MAX	RLA	LRA					CRHEATER PART NO.	FLA	NOMINAL KW*	MCA	MOCP†	FLA	LRA	
12	208/230-3-60	187	253	17.6	123	1.9	7.5	—	Low	—	—	—/—	51.0/ 51.0	60/ 60	54/ 54	314/314	
										225A00	20.0/ 23.1	7.5/10.0	51.0/ 51.0	60/ 60	54/ 54	314/314	
										226A00	30.0/ 34.6	11.3/15.0	51.0/ 52.7	60/ 60	54/ 54	314/314	
										227A00	50.0/ 57.7	18.8/25.0	71.9/ 81.5	80/ 90	66/ 75	314/314	
										228A00	70.0/ 80.8	26.3/35.0	96.9/110.4	100/125	89/102	314/314	
										229A00	80.0/ 92.4	30.0/40.0	109.4/124.8	110/125	101/115	314/314	
										230A00	100.1/115.5	37.6/50.0	134.5/124.8	150/150	124/141	314/314	
							10.2		High	—	—	—/—	53.7/ 53.7	60/ 60	57/ 57	331/331	
										225A00	20.0/ 23.1	7.5/10.0	53.7/ 53.7	60/ 60	57/ 57	331/331	
										226A00	30.0/ 34.6	11.3/15.0	53.7/ 56.1	60/ 60	57/ 57	331/331	
										227A00	50.0/ 57.7	18.8/25.0	75.3/ 84.9	80/ 90	69/ 78	331/331	
										228A00	70.0/ 80.8	26.3/35.0	100.3/113.8	110/125	92/105	331/331	
										229A00	80.0/ 92.4	30.0/40.0	112.8/128.2	125/150	104/118	331/331	
										230A00	100.1/115.5	37.6/50.0	137.8/128.2	150/150	127/145	331/331	
							7.5	—	Low	—	—	—/—	54.0/ 54.0	60/ 60	57/ 57	318/318	
										225A00	20.0/ 23.1	7.5/10.0	54.0/ 54.0	60/ 60	57/ 57	318/318	
										226A00	30.0/ 34.6	11.3/15.0	54.0/ 56.4	60/ 60	57/ 57	318/318	
										227A00	50.0/ 57.7	18.8/25.0	75.7/ 85.3	80/ 90	70/ 78	318/318	
										228A00	70.0/ 80.8	26.3/35.0	100.7/114.2	110/125	93/105	318/318	
										229A00	80.0/ 92.4	30.0/40.0	113.2/128.6	125/150	104/118	318/318	
										230A00	100.1/115.5	37.6/50.0	138.2/128.6	150/150	127/145	318/318	
							10.2		High	—	—	—/—	56.7/ 56.7	70/ 70	60/ 60	335/335	
										225A00	20.0/ 23.1	7.5/10.0	56.7/ 56.7	70/ 70	60/ 60	335/335	
										226A00	30.0/ 34.6	11.3/15.0	56.7/ 59.8	70/ 70	60/ 60	335/335	
										227A00	50.0/ 57.7	18.8/25.0	79.0/ 88.7	80/ 90	73/ 82	335/335	
										228A00	70.0/ 80.8	26.3/35.0	104.1/117.5	110/125	96/108	335/335	
										229A00	80.0/ 92.4	30.0/40.0	116.6/132.0	125/150	107/121	335/335	
										230A00	100.1/115.5	37.6/50.0	141.6/132.0	150/150	130/148	335/335	
	460-3-60	414	506	7.7	50	1.0	3.4	—	Low	—	—	—	22.7	30	24	130	
										232A00	11.5	10.0	22.7	30	24	130	
										233A00	17.3	15.0	25.9	30	24	130	
										234A00	28.9	25.0	40.3	45	37	130	
										235A00	40.4	35.0	54.8	60	50	130	
										236A00	46.2	40.0	62.0	70	57	130	
										237A00	57.7	50.0	62.0	70	70	130	
							4.8		High	—	—	—	24.1	30	26	139	
										232A00	11.5	10.0	24.1	30	26	139	
										233A00	17.3	15.0	27.7	30	26	139	
										234A00	28.9	25.0	42.1	45	39	139	
										235A00	40.4	35.0	56.5	60	52	139	
										236A00	46.2	40.0	63.7	70	59	139	
										237A00	57.7	50.0	63.7	70	72	139	
							3.4	—	Low	—	—	—	23.9	30	25	133	
										232A00	11.5	10.0	23.9	30	25	133	
										233A00	17.3	15.0	27.4	30	25	133	
										234A00	28.9	25.0	41.8	45	38	133	
										235A00	40.4	35.0	56.3	60	52	133	
										236A00	46.2	40.0	63.5	70	58	133	
										237A00	57.7	50.0	63.5	70	72	133	
							4.8		High	—	—	—	25.3	30	27	141	
										232A00	11.5	10.0	25.3	30	27	141	
										233A00	17.3	15.0	29.2	30	27	141	
										234A00	28.9	25.0	43.6	45	40	141	
										235A00	40.4	35.0	58.0	60	53	141	
										236A00	46.2	40.0	65.2	70	60	141	
										237A00	57.7	50.0	65.2	70	73	141	
	575-3-60	518	632	6.1	40.0	0.8	2.8	—	Low	—	—	—	20.1	20	21	124	
										239A00	13.9	15.0	20.8	25	21	124	
										240A00	23.1	25.0	32.4	35	32	124	
										241A00	32.3	35.0	43.9	45	42	124	
										242A00	37.0	40.0	49.7	50	48	124	
										243A00	46.2	50.0	49.7	60	58	124	
							3.3		High	—	—	—	18.6	20	20	142	
										239A00	13.9	15.0	21.4	25	20	142	
										240A00	23.1	25.0	33.0	35	30	142	
										241A00	32.3	35.0	45.1	45	41	142	
										242A00	37.0	40.0	50.3	50	46	142	
										243A00	46.2	50.0	50.3	60	57	142	
							2.8		—	Low	—	—	—	21.1	25	23	110
											239A00	13.9	15.0	24.6	25	23	110
											240A00	23.1	25.0	36.1	40	33	110
											241A00	32.3	35.0	47.7	50	44	110
											242A00	37.0	40.0	53.4	60	49	110
								243A00			46.2	50.0	53.4	60	60	110	
3.3							High	—		—	—	21.1	25	23	110		
								239A00		13.9	15.0	24.6	25	23	110		
								240A00		23.1	25.0	36.1	40	33	110		
								241A00		32.3	35.0	47.7	50	44	110		
								242A00		37.0	40.0	53.4	60	49	110		
								243A00		46.2	50.0	53.4	60	60	110		

Table 3 — Electrical Data — Units Without Optional Powered Convenience Outlet (cont)

UNIT 50PG	NOMINAL POWER SUPPLY VOLTS-PH-HZ	VOLTAGE RANGE		COMPRESS OR (EA.)		OFM FLA	IFM FLA	POWER EXHAUST FLA	IFM TYPE	ELECTRIC HEAT			POWER SUPPLY		DISCONNECT SIZE	
		MIN	MAX	RLA	LRA					CRHEATER PART NO.	FLA	NOMINAL KW*	MCA	MOCPT†	FLA	LRA
14	208/230-3-60	187	253	22.4	149	1.9	10.2	—	Low	—	—	—/—	64.5/ 64.5	80/ 80	68/ 68	383/383
										225A00	20.0/ 23.1	7.5/10.0	64.5/ 64.5	80/ 80	68/ 68	383/383
										226A00	30.0/ 34.6	11.3/15.0	64.5/ 64.5	80/ 80	68/ 68	383/383
										227A00	50.0/ 57.7	18.8/25.0	75.3/ 84.9	80/ 90	69/ 78	383/383
										228A00	70.0/ 80.8	26.3/35.0	100.3/113.8	110/125	92/105	383/383
										230A00	100.1/115.5	37.6/50.0	137.8/128.2	150/150	127/145	383/383
										231A00	120.1/138.6	45.1/60.0	162.8/151.3	175/175	150/171	383/383
							15.0		High	—	—	—/—	69.3/ 69.3	90/ 90	73/ 73	391/391
										225A00	20.0/ 23.1	7.5/10.0	69.3/ 69.3	90/ 90	73/ 73	391/391
										226A00	30.0/ 34.6	11.3/15.0	69.3/ 69.3	90/ 90	73/ 73	391/391
										227A00	50.0/ 57.7	18.8/25.0	81.3/ 90.9	90/100	75/ 84	391/391
										228A00	70.0/ 80.8	26.3/35.0	106.3/119.8	110/125	98/110	391/391
										230A00	100.1/115.5	37.6/50.0	143.8/134.2	150/150	132/150	391/391
										231A00	120.1/138.6	45.1/60.0	168.8/157.3	175/175	155/177	391/391
							10.2		Low	—	—	—/—	67.5/ 67.5	80/ 80	71/ 71	387/387
										225A00	20.0/ 23.1	7.5/10.0	67.5/ 67.5	80/ 80	71/ 71	387/387
										226A00	30.0/ 34.6	11.3/15.0	67.5/ 67.5	80/ 80	71/ 71	387/387
										227A00	50.0/ 57.7	18.8/25.0	79.0/ 88.7	80/ 90	73/ 82	387/387
										228A00	70.0/ 80.8	26.3/35.0	104.1/117.5	110/125	96/108	387/387
										230A00	100.1/115.5	37.6/50.0	141.6/132.0	150/150	130/148	387/387
										231A00	120.1/138.6	45.1/60.0	166.6/155.1	175/175	153/175	387/387
							15.0		High	—	—	—/—	72.3/ 72.3	90/ 90	77/ 77	395/395
										225A00	20.0/ 23.1	7.5/10.0	72.3/ 72.3	90/ 90	77/ 77	395/395
										226A00	30.0/ 34.6	11.3/15.0	72.3/ 72.3	90/ 90	77/ 77	395/395
										227A00	50.0/ 57.7	18.8/25.0	85.0/ 94.7	90/100	78/ 87	395/395
										228A00	70.0/ 80.8	26.3/35.0	110.1/123.5	125/125	101/114	395/395
										230A00	100.1/115.5	37.6/50.0	147.6/138.0	150/150	136/153	395/395
										231A00	120.1/138.6	45.1/60.0	172.6/161.1	175/175	159/180	395/395
	460-3-60	414	506	10.6	75	1.0	4.8	—	Low	—	—	—	30.6	40	32	190
										232A00	11.5	10.0	30.6	40	32	190
										233A00	17.3	15.0	30.6	40	32	190
										234A00	28.9	25.0	42.1	45	39	190
										235A00	40.4	35.0	56.5	60	52	190
										237A00	57.7	50.0	63.7	70	72	190
										238A00	69.3	60.0	75.3	90	85	190
							7.4		High	—	—	—	33.2	40	35	194
										232A00	11.5	10.0	33.2	40	35	194
										233A00	17.3	15.0	33.2	40	35	194
										234A00	28.9	25.0	45.3	50	42	194
										235A00	40.4	35.0	59.8	60	55	194
										237A00	57.7	50.0	67.0	80	75	194
										238A00	69.3	60.0	78.5	90	88	194
							4.8	1.2	Low	—	—	—	31.8	40	34	192
										232A00	11.5	10.0	31.8	40	34	192
										233A00	17.3	15.0	31.8	40	34	192
										234A00	28.9	25.0	43.6	45	40	192
										235A00	40.4	35.0	58.0	60	53	192
										237A00	57.7	50.0	65.2	70	73	192
										238A00	69.3	60.0	76.8	90	87	192
							7.4		High	—	—	—	34.4	45	37	197
										232A00	11.5	10.0	34.4	45	37	197
										233A00	17.3	15.0	34.4	45	37	197
										234A00	28.9	25.0	46.8	50	43	197
										235A00	40.4	35.0	61.3	70	56	197
										237A00	57.7	50.0	68.5	80	76	197
										238A00	69.3	60.0	80.0	90	90	197
	575-3-60	518	632	10.6	59.0	0.8	3.3	—	Low	—	—	—	28.7	25	30	180
										239A00	13.9	15.0	28.7	25	30	180
										240A00	23.1	25.0	33.0	35	30	180
										241A00	32.3	35.0	45.1	45	41	180
										242A00	37.0	40.0	50.3	50	46	180
										243A00	46.2	50.0	50.3	60	57	180
										244A00	55.4	60.0	59.6	60	68	180
							5.6		High	—	—	—	31.0	30	33	191
										239A00	13.9	15.0	31.0	30	33	191
										240A00	23.1	25.0	35.9	40	33	191
										241A00	32.3	35.0	47.4	50	44	191
										242A00	37.0	40.0	53.2	60	49	191
										243A00	46.2	50.0	53.2	60	60	191
										244A00	55.4	60.0	62.4	70	70	191
							3.3	3.0	Low	—	—	—	24.7	30	26	138
										239A00	13.9	15.0	24.7	30	26	138
										240A00	23.1	25.0	36.1	40	33	138
										241A00	32.3	35.0	47.7	50	44	138
242A00	37.0	40.0	53.4	60	49	138										
243A00	46.2	50.0	53.4	60	60	138										
244A00	55.4	60.0	62.7	70	70	138										
5.6	High	—	—	—	27.5	30	29	151								
		239A00	13.9	13.9	28.1	30	29	151								
		240A00	23.1	23.1	39.6	40	36	151								
		241A00	32.3	32.3	51.2	60	47	151								
		242A00	37.0	37.0	56.9	60	52	151								
		243A00	46.2	46.2	56.9	60	63	151								
		244A00	55.4	55.4	66.2	70	74	151								

- LEGEND
- FLA** – Full Load Amps
 - HACR** – Heating, Air Conditioning and Refrigeration
 - IFM** – Indoor (Evaporator) Fan Motor
 - LRA** – Locked Rotor Amps
 - MCA** – Minimum Circuit Amps
 - MOCP** – Maximum Overcurrent Protection
 - NEC** – National Electrical Code
 - OFM** – Outdoor (Condenser) Fan Motor
 - RLA** – Rated Load Amps

* Heater capacity (kW) is based on heater voltage of 208 v, 230 v, 480 v, or 600 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

† Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$



50PG08-16

Example: Supply voltage is 460-3-60



AB = 224 v

BC = 231 v

AC = 226 v

$$\begin{aligned} \text{Average Voltage} &= \frac{224 + 231 + 226}{3} \\ &= \frac{681}{3} \\ &= 227 \end{aligned}$$

Determine maximum deviation from average voltage.

(AB) 227 – 224 = 3 v

(BC) 231 – 227 = 4 v

(AC) 227 – 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{227} \\ &= 1.76\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Table 3 — Electrical Data — Units Without Optional Powered Convenience Outlet (cont)

UNIT 50PG	NOMINAL POWER SUPPLY (V-PH-HZ)	VOLTAGE RANGE		COMPR NO. 1		COMPR NO. 2		COMPR NO. 3		OF MFL A	POWER EXHAUST		IFM TYPE	IFM FLA	ELECTRIC HEAT			POWER SUPPLY		DISCONNECT SIZE	
		MIN	MAX	RLA	LRA	RLA	LRA	RLA	LRA		QTY	FLA			CRHEATER PART NO.	FLA	NOMINAL KW*	MCA	MOCp	FLA	LRA
16	208/230-3-60	187	253	18.1	137	18.1	137	17.6	123	1.9	—	—	Low	10.2	—	—	—/—	74.2/74.2	90/ 90	80/ 80	482/482
															255A00	52.1/60.1	18.8/25.0	77.9/87.9	90/ 90	80/ 81	482/482
															256A00	104.2/120.3	37.6/50.0	143.0/133.0	150/150	132/150	482/482
															257A00	156.3/180.4	56.3/75.0	169.1/193.2	200/225	192/219	482/482
													Mid-Low	15.0	—	—	—/—	79.0/79.0	90/ 90	86/ 86	491/491
															255A00	52.1/60.1	18.8/25.0	83.9/ 93.9	90/100	86/ 86	491/491
															256A00	104.2/120.3	37.6/50.0	149.0/139.0	150/175	137/156	491/491
															257A00	156.3/180.4	56.3/75.0	175.1/199.2	200/225	197/225	491/491
													High	19.4	—	—	—/—	83.4/83.4	100/100	91/91	529/529
															255A00	52.1/ 0.1	18.8/25.0	89.4/99.4	100/100	91/91	529/529
															256A00	104.2/120.3	37.6/50.0	154.5/144.5	175/175	142/161	529/529
															257A00	156.3/180.4	56.3/75.0	180.6/204.7	200/225	202/230	529/529
	460-3-60	414	506	9.0	62	9.0	62	7.7	50	1.0	—	—	Low	10.2	—	—	—/—	77.2/77.2	90/ 90	84/ 84	486/486
															255A00	52.1/60.1	18.8/25.0	81.6/91.7	90/100	84/ 84	486/486
															256A00	104.2/120.3	37.6/50.0	146.8/136.8	150/150	135/154	486/486
															257A00	156.3/180.4	56.3/75.0	172.8/196.9	200/225	195/223	486/486
													Mid-Low	15.0	—	—	—/—	82.0/82.0	100/100	89/ 89	495/495
															255A00	52.1/ 60.1	18.8/25.0	87.6/97.7	100/100	89/ 90	495/495
															256A00	104.2/120.3	37.6/50.0	152.8/142.8	175/175	141/159	495/495
															257A00	156.3/180.4	56.3/75.0	178.8/202.9	200/225	200/228	495/495
													High	19.4	—	—	—/—	86.4/86.4	100/100	94/ 94	533/533
															255A00	52.1/ 60.1	18.8/25.0	93.1/103.2	100/110	94/ 95	533/533
															256A00	104.2/120.3	37.6/50.0	158.3/148.3	175/175	146/164	533/533
															257A00	156.3/180.4	56.3/75.0	184.3/208.4	200/250	206/233	533/533
	575-3-60	518	633	6.8	50	6.8	50	6.1	40	0.8	—	—	Low	2.8	—	—	—/—	26.6	30	29	167
															261A00	24.1	25.0	33.6	35	31	167
															262A00	46.2	50.0	49.7	60	56	167
															263A00	72.2	75.0	75.7	80	86	167
													Mid-Low	5.6	—	—	—/—	29.4	35	32	181
															261A00	24.1	25.0	37.1	40	34	181
															262A00	46.2	50.0	53.2	60	60	181
															263A00	72.2	75.0	79.2	90	89	181
													High	7.8	—	—	—/—	31.6	35	34	196
															261A00	24.1	25.0	39.8	40	37	196
															262A00	46.2	50.0	55.9	60	62	196
															263A00	72.2	75.0	81.9	90	92	196
	208/230-3-60	187	253	18.1	137	18.1	137	17.6	123	1.9	—	—	Low	10.2	—	—	—/—	74.2/74.2	90/ 90	80/ 80	482/482
															255A00	52.1/60.1	18.8/25.0	77.9/87.9	90/ 90	80/ 81	482/482
															256A00	104.2/120.3	37.6/50.0	143.0/133.0	150/150	132/150	482/482
															257A00	156.3/180.4	56.3/75.0	169.1/193.2	200/225	192/219	482/482
													Mid-Low	15.0	—	—	—/—	79.0/79.0	90/ 90	86/ 86	491/491
															255A00	52.1/60.1	18.8/25.0	83.9/ 93.9	90/100	86/ 86	491/491
															256A00	104.2/120.3	37.6/50.0	149.0/139.0	150/175	137/156	491/491
															257A00	156.3/180.4	56.3/75.0	175.1/199.2	200/225	197/225	491/491
													High	19.4	—	—	—/—	83.4/83.4	100/100	91/91	529/529
															255A00	52.1/ 0.1	18.8/25.0	89.4/99.4	100/100	91/91	529/529
															256A00	104.2/120.3	37.6/50.0	154.5/144.5	175/175	142/161	529/529
															257A00	156.3/180.4	56.3/75.0	180.6/204.7	200/225	202/230	529/529

50PG08-16

Table 4—Electrical Data — Units With Optional Powered Convenience Outlet

UNIT 50PG	NOMINAL POWER SUPPLY VOLTS-PH-HZ	VOLTAGE RANGE		COMPRESS OR		OFM FLA	IFM FLA	POWER EXHAUST FLA	IFM TYPE	ELECTRIC HEAT			POWER SUPPLY		DISCONNECT SIZE	
		MIN	MAX	RLA	LRA					CRHEATER PART NO.	FLA	NOMINAL KW*	MCA	MOCPT†	FLA	LRA
08	208/230-3-60	187	253	13.5	88	1.5	5.2	—	Low	—	—	—/—	43.3/ 43.3	50/ 50	46/ 46	217/217
										225A00	20.0/23.1	7.5/10.0	43.3/ 43.3	50/ 50	46/ 46	217/217
										226A00	30.0/34.6	11.3/15.0	50.0/ 55.2	60/ 60	46/ 51	217/217
										227A00	50.0/57.7	18.8/25.0	75.1/ 84.1	80/ 90	69/ 78	217/217
										228A00	70.0/80.8	26.3/35.0	100.1/113.0	110/125	92/104	217/217
										229A00	80.0/92.4	30.0/40.0	112.6/127.4	125/150	104/118	217/217
							7.5	—	High	—	—	—/—	45.6/ 45.6	50/ 50	49/ 49	243/243
										225A00	20.0/23.1	7.5/10.0	45.6/ 45.6	50/ 50	49/ 49	243/243
										226A00	30.0/34.6	11.3/15.0	52.9/ 58.1	60/ 60	49/ 54	243/243
										227A00	50.0/57.7	18.8/25.0	77.9/ 87.0	80/ 90	72/ 81	243/243
										228A00	70.0/80.8	26.3/35.0	102.9/115.9	110/125	95/107	243/243
										229A00	80.0/92.4	30.0/40.0	115.4/130.3	125/150	106/120	243/243
							5.2	3.0	Low	—	—	—/—	46.3/ 46.3	50/ 50	49/ 49	221/221
										225A00	20.0/23.1	7.5/10.0	46.3/ 46.3	50/ 50	49/ 49	221/221
										226A00	30.0/34.6	11.3/15.0	53.8/ 59.0	60/ 60	49/ 55	221/221
										227A00	50.0/57.7	18.8/25.0	78.8/ 87.9	80/ 90	72/ 81	221/221
										228A00	70.0/80.8	26.3/35.0	103.8/116.7	110/125	96/108	221/221
										229A00	80.0/92.4	30.0/40.0	116.3/131.2	125/150	107/121	221/221
							7.5		High	—	—	—/—	48.6/ 48.6	60/ 60	52/ 52	247/247
										225A00	20.0/23.1	7.5/10.0	48.6/ 48.6	60/ 60	52/ 52	247/247
										226A00	30.0/34.6	11.3/15.0	56.7/ 61.9	60/ 70	52/ 57	247/247
										227A00	50.0/57.7	18.8/25.0	81.7/ 90.7	90/100	75/ 84	247/247
										228A00	70.0/80.8	26.3/35.0	106.7/119.6	110/125	98/111	247/247
										229A00	80.0/92.4	30.0/40.0	119.2/134.0	125/150	110/124	247/247
	460-3-60	414	506	6.4	39	0.8	2.6	—	Low	—	—	—	20.8	25	22	98
										232A00	11.5	10.0	20.8	25	22	98
										233A00	17.3	15.0	27.6	30	25	98
										234A00	28.9	25.0	42.1	45	39	98
										235A00	40.4	35.0	56.5	60	52	98
										236A00	46.2	40.0	63.7	70	59	98
							3.4		High	—	—	—	21.6	25	23	111
										232A00	11.5	10.0	21.6	25	23	111
										233A00	17.3	15.0	28.6	30	26	111
										234A00	28.9	25.0	43.1	45	40	111
										235A00	40.4	35.0	57.5	60	53	111
										236A00	46.2	40.0	64.7	70	60	111
							2.6	1.2	Low	—	—	—	22.0	25	23	101
										232A00	11.5	10.0	22.0	25	23	101
										233A00	17.3	15.0	29.1	30	27	101
										234A00	28.9	25.0	43.6	45	40	101
										235A00	40.4	35.0	58.0	60	53	101
										236A00	46.2	40.0	65.2	70	60	101
							3.4		High	—	—	—	22.8	25	24	114
										232A00	11.5	10.0	22.9	25	24	114
										233A00	17.3	15.0	30.1	35	28	114
										234A00	28.9	25.0	44.6	45	41	114
										235A00	40.4	35.0	59.0	60	54	114
										236A00	46.2	40.0	66.2	70	61	114
	575-3-60	518	632	6.4	30.0	0.8	2.0	—	Low	—	—	—	20.1	20	21	86
										239A00	13.9	15.0	22.0	25	21	86
										240A00	23.1	25.0	33.5	35	31	86
										241A00	32.3	35.0	45.1	50	41	86
										242A00	37.0	40.0	50.9	60	47	86
										—	—	—	20.6	20	22	104
							2.8	3.0	High	239A00	13.9	15.0	23.0	25	22	104
										240A00	23.1	25.0	34.5	35	32	104
										241A00	32.3	35.0	46.1	50	42	104
										242A00	37.0	40.0	51.9	60	48	104
										—	—	—	19.9	25	21	88
										239A00	13.9	15.0	25.7	30	24	88
										240A00	23.1	25.0	37.3	40	34	88
										241A00	32.3	35.0	48.8	50	45	88
										242A00	37.0	40.0	54.6	60	50	88
							2.8	3.0	Low	—	—	—	20.7	25	22	100
										239A00	13.9	15.0	26.7	30	25	100
										240A00	23.1	25.0	38.3	40	35	100
										241A00	32.3	35.0	49.8	50	46	100
										242A00	37.0	40.0	55.6	60	51	100

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Table 4 — Electrical Data — Units With Optional Powered Convenience Outlet (cont)

UNIT 50PG	NOMINAL POWER SUPPLY VOLTS-PH-HZ	VOLTAGE RANGE		COMPRESSOR		OFM FLA	IFM FLA	POWER EXHAUST FLA	IFM TYPE	ELECTRIC HEAT			POWER SUPPLY		DISCONNECT SIZE		
		MIN	MAX	RLA	LRA					CRHEATER PART NO.	FLA	NOMINAL KW*	MCA	MOCPT†	FLA	LRA	
09	208/230-3-60	187	253	16.0	91	1.5	5.2	—	Low	—	—	—/—	49.1/ 49.1	60/ 60	52/ 52	223/223	
										225A00	20.0/23.1	7.5/10.0	49.1/ 49.1	60/ 60	52/ 52	223/223	
										226A00	30.0/34.6	11.3/15.0	50.0/ 55.2	60/ 60	52/ 52	223/223	
										227A00	50.0/57.7	18.8/25.0	75.1/ 84.1	80/ 90	69/ 78	223/223	
										228A00	70.0/80.8	26.3/35.0	100.1/113.0	110/125	92/104	223/223	
										229A00	80.0/92.4	30.0/40.0	112.6/127.4	125/150	104/118	223/223	
							10.2	—	High	—	—	—/—	54.1/ 54.1	60/ 60	58/ 58	266/266	
										225A00	20.0/23.1	7.5/10.0	54.1/ 54.1	60/ 60	58/ 58	266/266	
										226A00	30.0/34.6	11.3/15.0	56.3/ 61.5	60/ 70	58/ 58	266/266	
										227A00	50.0/57.7	18.8/25.0	81.3/ 90.4	90/100	75/ 84	266/266	
										228A00	70.0/80.8	26.3/35.0	106.3/119.2	110/125	98/110	266/266	
										229A00	80.0/92.4	30.0/40.0	118.8/133.7	125/150	109/123	266/266	
							5.2	3.0	Low	—	—	—/—	52.1/ 52.1	60/ 60	55/ 55	227/227	
										225A00	20.0/23.1	7.5/10.0	52.1/ 52.1	60/ 60	55/ 55	227/227	
										226A00	30.0/34.6	11.3/15.0	53.8/ 59.0	60/ 60	55/ 55	227/227	
										227A00	50.0/57.7	18.8/25.0	78.8/ 87.9	80/ 90	72/ 81	227/227	
										228A00	70.0/80.8	26.3/35.0	103.8/116.7	110/125	96/108	227/227	
										229A00	80.0/92.4	30.0/40.0	116.3/131.2	125/150	107/121	227/227	
							10.2		High	—	—	—/—	57.1/ 57.1	70/ 70	61/ 61	270/270	
										225A00	20.0/23.1	7.5/10.0	57.1/ 57.1	70/ 70	61/ 61	270/270	
										226A00	30.0/34.6	11.3/15.0	60.0/ 65.2	70/ 70	61/ 61	270/270	
										227A00	50.0/57.7	18.8/25.0	85.1/ 94.1	90/100	78/ 87	270/270	
										228A00	70.0/80.8	26.3/35.0	110.1/123.0	125/125	101/114	270/270	
										229A00	80.0/92.4	30.0/40.0	122.6/137.4	125/150	113/127	270/270	
	460-3-60	414	506	7.1	46	0.8	2.6	—	Low	—	—	—	22.2	25	24	112	
										232A00	11.5	10.0	22.2	25	24	112	
										233A00	17.3	15.0	27.6	30	25	112	
										234A00	28.9	25.0	42.1	45	39	112	
										235A00	40.4	35.0	56.5	60	52	112	
										236A00	46.2	40.0	63.7	70	59	112	
							4.8		High	—	—	—	24.4	30	26	134	
										232A00	11.5	10.0	24.4	30	26	134	
										233A00	17.3	15.0	30.4	35	28	134	
										234A00	28.9	25.0	44.8	45	41	134	
										235A00	40.4	35.0	59.2	60	54	134	
										236A00	46.2	40.0	66.5	70	61	134	
							2.6	1.2	Low	—	—	—	23.4	30	25	115	
										232A00	11.5	10.0	23.4	30	25	115	
										233A00	17.3	15.0	29.1	30	27	115	
										234A00	28.9	25.0	43.6	45	40	115	
										235A00	40.4	35.0	58.0	60	53	115	
										236A00	46.2	40.0	65.2	70	60	115	
							4.8		High	—	—	—	25.6	30	27	136	
										232A00	11.5	10.0	25.6	30	27	136	
										233A00	17.3	15.0	31.9	35	29	136	
										234A00	28.9	25.0	46.3	50	43	136	
										235A00	40.4	35.0	60.7	70	56	136	
										236A00	46.2	40.0	68.0	70	63	136	
	575-3-60	518	632	5.6	37.0	0.8	2.0	—	Low	—	—	—	17.9	20	19	100	
										239A00	13.9	15.0	22.0	25	20	100	
										240A00	23.1	25.0	33.5	35	31	100	
										241A00	32.3	35.0	45.1	50	41	100	
										242A00	37.0	40.0	50.9	60	47	100	
										—	—	—	19.2	25	21	138	
							3.3		High	239A00	13.9	15.0	23.6	25	22	138	
										240A00	23.1	25.0	35.2	35	32	138	
										241A00	32.3	35.0	46.7	50	43	138	
										242A00	37.0	40.0	52.5	60	48	138	
										—	—	—	20.9	25	22	94	
							2.0	3.0	Low	239A00	13.9	15.0	25.7	30	24	94	
										240A00	23.1	25.0	37.3	40	34	94	
										241A00	32.3	35.0	48.8	50	45	94	
										242A00	37.0	40.0	54.6	60	50	94	
										—	—	—	21.7	25	23	105	
										239A00	13.9	15.0	26.7	30	25	105	
							3.3		High	240A00	23.1	25.0	38.3	40	35	105	
										241A00	32.3	35.0	49.8	50	46	105	
										242A00	37.0	40.0	55.6	60	51	105	
—	—	—	—	—	—	—											

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- LEGEND
- FLA** – Full Load Amps
 - HACR** – Heating, Air Conditioning and Refrigeration
 - IFM** – Indoor (Evaporator) Fan Motor
 - LRA** – Locked Rotor Amps
 - MCA** – Minimum Circuit Amps
 - MOCP** – Maximum Overcurrent Protection
 - NEC** – National Electrical Code
 - OFM** – Outdoor (Condenser) Fan Motor
 - RLA** – Rated Load Amps

* Heater capacity (kW) is based on heater voltage of 208 v, 230 v, 480 v, or 600 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.
 † Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
 Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$



50PG08-16

Example: Supply voltage is 460-3-60



AB = 224 v

BC = 231 v

AC = 226 v

$$\begin{aligned} \text{Average Voltage} &= \frac{224 + 231 + 226}{3} \\ &= \frac{681}{3} \\ &= 227 \end{aligned}$$

Determine maximum deviation from average voltage.

(AB) 227 – 224 = 3 v

(BC) 231 – 227 = 4 v

(AC) 227 – 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{227} \\ &= 1.76\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

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LEGEND

- FLA** – Full Load Amps
- HACR** – Heating, Air Conditioning and Refrigeration
- IFM** – Indoor (Evaporator) Fan Motor
- LRA** – Locked Rotor Amps
- MCA** – Minimum Circuit Amps
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- NEC** – National Electrical Code
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* Heater capacity (kW) is based on heater voltage of 208 v, 230 v, 480 v, or 600 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.
 † Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
 Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$



Example: Supply voltage is 460-3-60



AB = 224 v
 BC = 231 v
 AC = 226 v

$$\begin{aligned} \text{Average Voltage} &= \frac{224 + 231 + 226}{3} \\ &= \frac{681}{3} \\ &= 227 \end{aligned}$$

Determine maximum deviation from average voltage.

(AB) 227 – 224 = 3 v
 (BC) 231 – 227 = 4 v
 (AC) 227 – 226 = 1 v
 Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{227} \\ &= 1.76\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

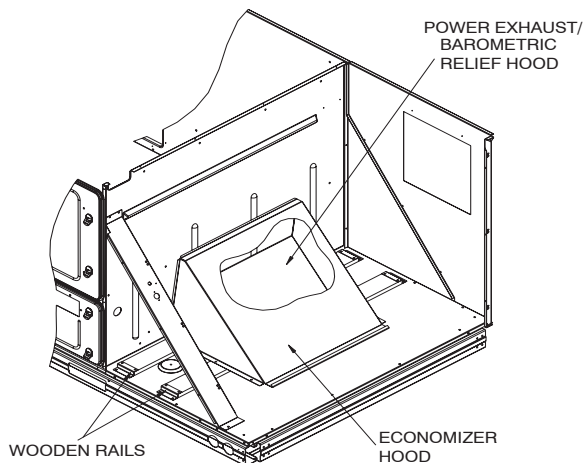
Step 8 —Optional EconoMi\$er IV

The optional EconoMi\$er IV comes from the factory fully wired. The outdoor air hoods must be installed. No field wiring is required for standard outdoor dry bulb changeover operation. Field wiring of accessory sensors is required for different operational modes.

Install Outdoor Air Hoods

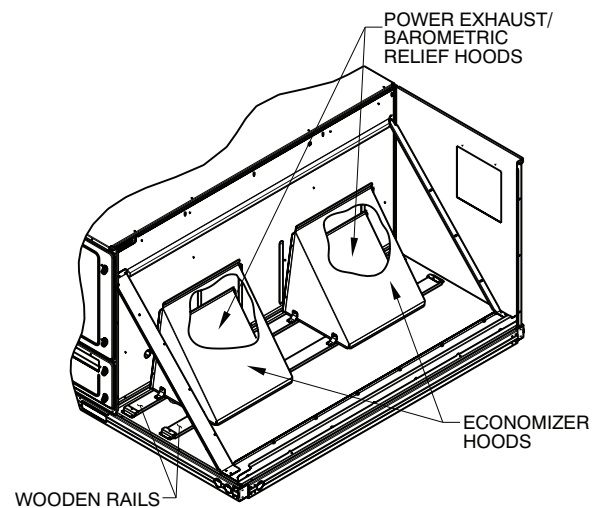
Perform the following procedure to install the outdoor-air hoods:

1. Economizer and barometric relief hoods are located in the condenser section under the slanted coil for shipping. (See Fig. 13 and 14.) Size 16 units also have two 1-in. cleanable filters and a baffle stored between the economizer hoods. Barometric relief/power exhaust hood is shipped inside of economizer hood. Remove screws that secure the wooden rails of the hood assemblies to the unit. Save screws. Slide complete assembly from condenser section. On size 16 units, remove the baffle and save screws. Slide complete assembly from condenser section. On size 16 units, remove the baffle and save screws.
2. Remove the screws that secure the economizer and barometric relief/power exhaust hoods to the wooden railing. Discard or recycle wooden rails. Save screws.
3. The barometric relief damper is secured to the economizer panel for shipping. Remove the screw holding the barometric relief damper to the panel. Damper should be free to swing open during operation. (See Fig. 15 and 16.) On size 16 units, repeat for second hood.
4. Hang the barometric relief/power exhaust hood on the mounting flange on the economizer panel. Secure hood to panel with screws saved from Step 2. (See Fig. 15-17.) On size 16 units, repeat for second hood.
5. Align hole in flange of economizer panel with left edge of hood. Hang economizer hood on the top flange of the economizer panel by rotating hood until top flange of the economizer hood engages the bent flange on the economizer panel. Rotate hood until hood is flush with the economizer panel. Hood will support itself from flange. Align holes in hood with holes in panel and secure hood to panel with screws saved from Step 2. (See Fig. 13, 14 and 18.)
Size 16 Only — Loosen screws securing the clip on top of the flange of each opening. Rotate clip 180 degrees and tighten screw. Install 1-in. filter provided by inserting under the clip on the flange and letting filter drop behind bracket holding barometric relief hoods. Repeat for second hood.
6. On size 16 units, install baffle between the outdoor air hoods with the screws saved from Step 1. (See Fig. 16.)



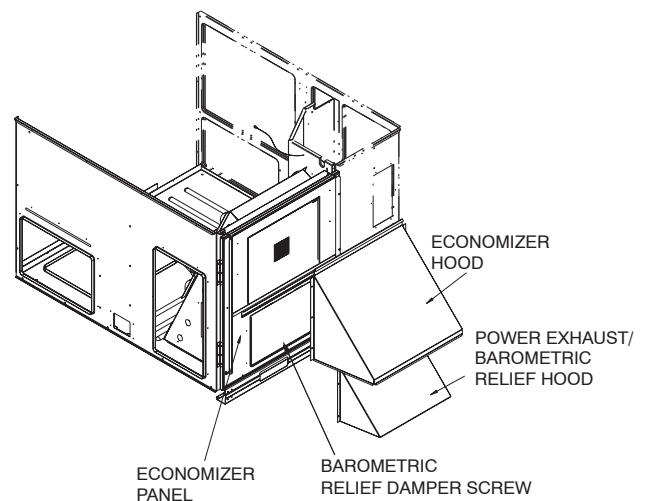
C06290

Fig. 13 – Economizer and Barometric Relief/Power Exhaust Hoods Shipping Positions (50PG08-14)



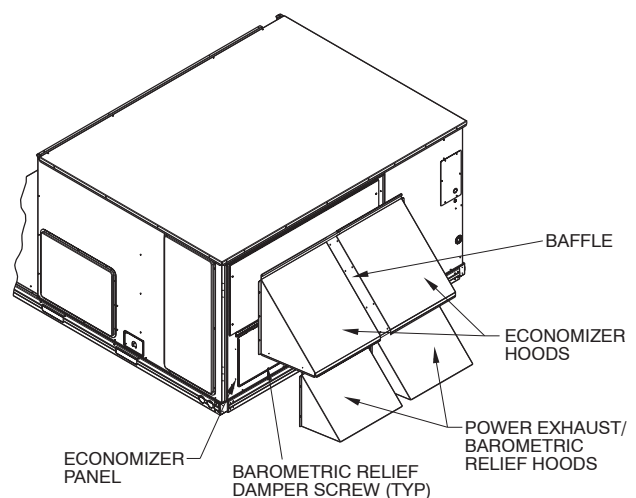
C06259

Fig. 14 – Economizer and Barometric Relief/Power Exhaust Hoods Shipping Positions (50PG16)



C06260

Fig. 15 – Hood Installation (50PG08-14)



C06261

Fig. 16 – Hood Installation (50PG16)

EconoMi\$er IV Standard Sensors

Outdoor Air Temperature (OAT) Sensor

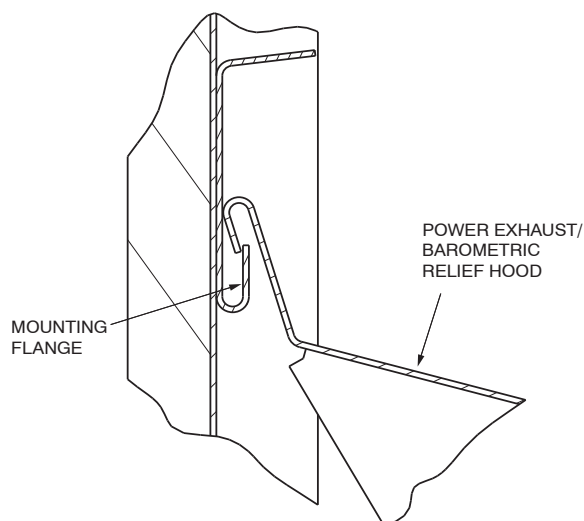
The outdoor air temperature sensor is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi\$er IV can be used for free cooling. The sensor is factory-installed on the EconoMi\$er IV in the outdoor airstream. The operating range of temperature measurement is 40° to 100°F.

Mixed Air Temperature (MAT) Sensor

The mixed air temperature sensor is a 3 K thermistor located at the discharge of the indoor fan. The sensor is mounted through the side plate of the blower. The sensor is a probe and has blue leads. This sensor is factory installed. The operating range of temperature measurement is 0° to 158°F.

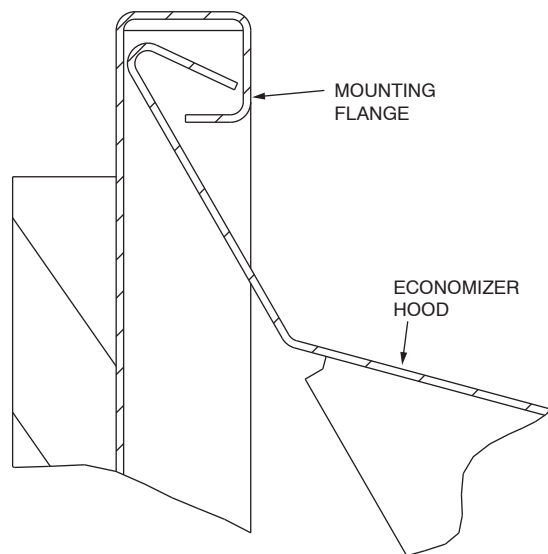
Outdoor Air Lockout Sensor

The EconoMi\$er IV is equipped with a temperature limit switch located in the outdoor airstream which is used to lock out the compressors below a 50°F ambient temperature.



C06262

Fig. 17 – Barometric Relief/Power Exhaust Hood Flange



C06263

Fig. 18 – Economizer Flange

EconoMi\$er IV Controller Wiring and Operational Modes

Determine the EconoMi\$er IV control mode before installing sensors and accessories. Different sensors are required for

different control modes, and a number of accessories are available. Refer to Table 5. The EconoMi\$er IV is supplied from the factory with a mixed air temperature sensor and an outdoor air temperature sensor. This allows for operation of the EconoMi\$er IV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi\$er IV and unit. See Fig. 19 for wiring.

Outdoor Dry Bulb Changeover

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and mixed air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMi\$er IV will adjust the outside air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outside air dampers will be controlled to provide free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. The scale on the potentiometer is A, B, C, and D. See Fig. 20 for the corresponding temperature changeover values.

Differential Dry Bulb Changeover

For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory dry bulb sensor (part number CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. Connect the return air temperature sensor to the S_R terminal (after removing the 620-ohm resistor) and to the + terminal on the controller. (See Fig. 21.)

In this mode of operation, the outdoor-air temperature is compared to the return-air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the enthalpy setpoint potentiometer fully clockwise to the D setting. (See Fig. 22.)

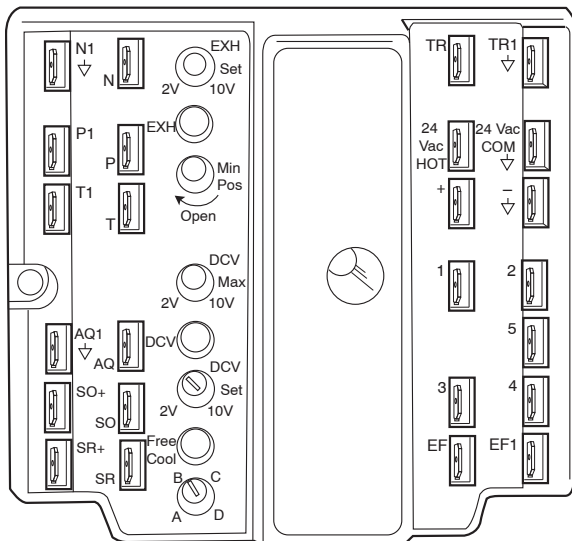
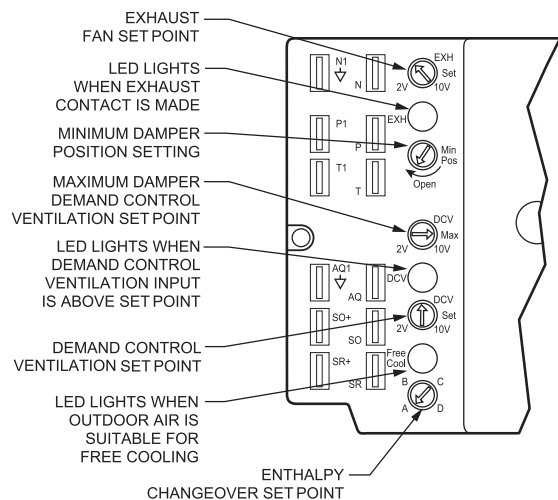
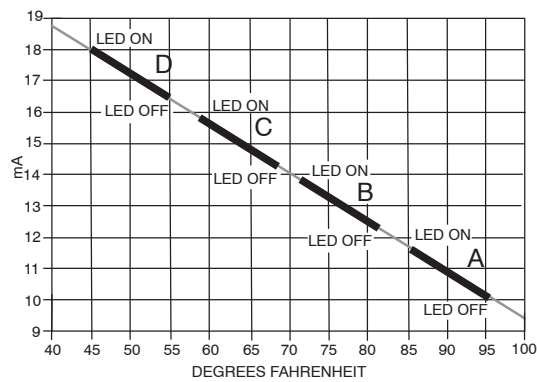
Outdoor Enthalpy Changeover

For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. When the outdoor air enthalpy rises above the outdoor enthalpy changeover set point, the outdoor-air damper moves to its minimum position. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi\$er IV controller. The set points are A, B, C, and D. (See Fig. 23.) The factory-installed 620-ohm jumper must be in place across terminals S_R and + on the EconoMi\$er IV controller. (See Fig. 21.)

Differential Enthalpy Control

For differential enthalpy control, the EconoMi\$er IV controller uses two enthalpy sensors (CRENTDIF004A00), one in the outside air and one in the return air duct. The EconoMi\$er IV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMi\$er IV use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air, the EconoMi\$er IV opens to bring in outdoor air for free cooling.

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. Mount the return air enthalpy sensor in the return air duct. The return air enthalpy sensor is wired to terminals S_R and + on the EconoMi\$er IV controller. (See Fig. 21.) The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi\$er IV controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.



Indoor Air Quality (IAQ) Sensor Input

The IAQ input can be used for demand control ventilation control based on the level of CO₂ measured in the space or return air duct.

Mount the optional IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined set point. (See Fig. 24.)

If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the EconoMi\$er IV control board will be damaged. (See Fig. 19.)

Power Exhaust

The factory-installed power exhaust will be factory wired and installed. If an accessory power exhaust is to be installed, see the accessory power exhaust installation instructions included with the power exhaust for installation and wiring. The wiring plug on the power exhaust is connected to wiring harness plug PL1-3,4.

Table 5—EconoMi\$er IV Sensor Usage

APPLICATION	ECONOMISER IV WITH OUTDOOR AIR DRY BULB SENSOR			ECONOMISER IV WITH SINGLE ENTHALPY SENSOR		
	Accessories Required			Accessories Required		
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.			CRTEMPSN002A00*		
Differential Dry Bulb	CRTEMPSN002A00*			(2) CRTEMPSN002A00*		
Single Enthalpy	HH57AC078			None. The single enthalpy sensor is factory installed.		
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*			CRENTDIF004A00*		
CO ₂ for DCV Control using a wall-mounted CO ₂ sensor	33ZCSENCO2			33ZCSENCO2		
CO ₂ for DCV Control using a duct-mounted CO ₂ sensor	33ZCSENCO2† and 33ZCASPCO2**	O R	CRCBDIOX005A00††	33ZCSENCO2† and 33ZCASPCO2**	O R	CRCBDIOX005A00††

*CRENTDIF004A00 and CRTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.

**33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.

† 33ZCSENCO2 is an accessory CO₂ sensor.

†† CRCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.

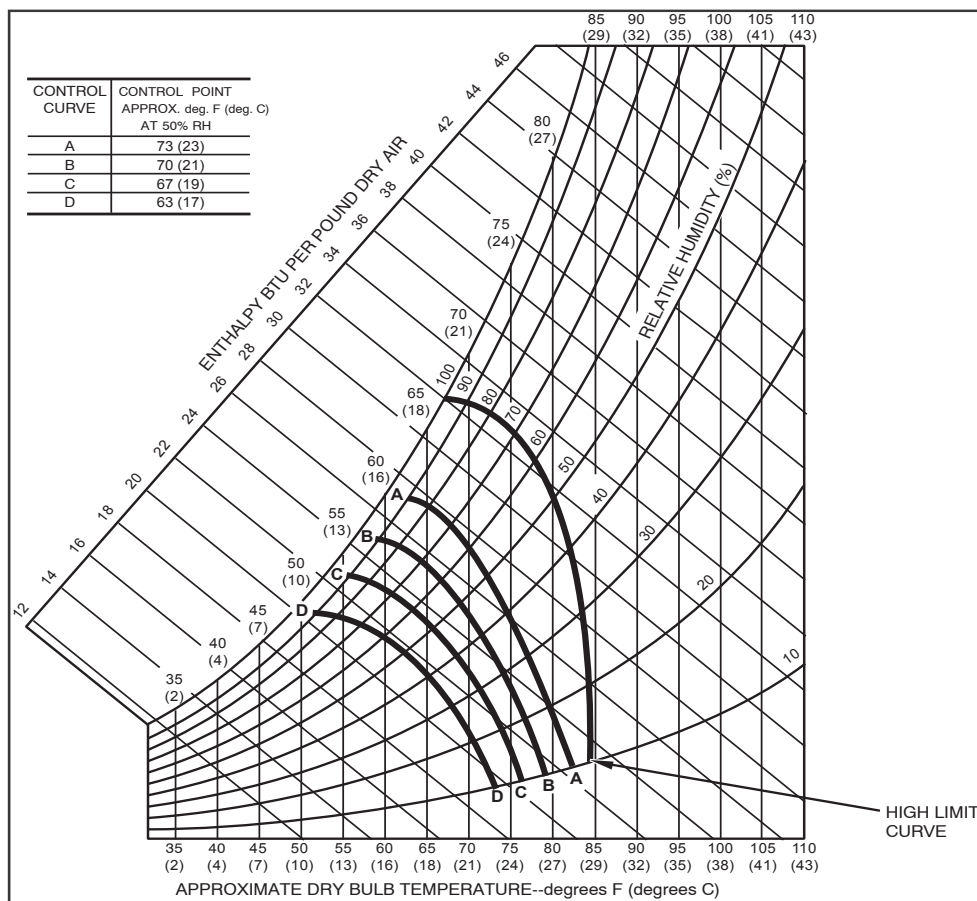


Fig. 23 – Enthalpy Changeover Set Points

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Exhaust Set Point Adjustment

The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. The set point represents the damper position above which the exhaust fans will be turned on. When there is a call for exhaust, the EconoMi\$er IV controller provides a 45 ± 15 second delay before exhaust fan activation to allow the dampers to open. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

Minimum Position Control

There is a minimum damper position potentiometer on the EconoMi\$er IV controller. (See Fig. 22.) The minimum damper position maintains the minimum airflow into the building during the occupied period.

When using demand ventilation, the minimum damper position represents the minimum ventilation position for VOC (volatile organic compounds) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

When demand ventilation control is not being used, the minimum position potentiometer should be used to set the occupied ventilation position. The maximum demand ventilation position should be turned fully clockwise.

Adjust the minimum position potentiometer to allow the minimum amount of outdoor air, as required by local codes, to enter the building. Make minimum position adjustments with at least 10°F temperature difference between the outdoor and return-air temperatures.

To determine the minimum position setting, perform the following procedure:

1. Calculate the appropriate mixed air temperature using the following formula:

$$(T_O \times OA) + (T_R \times RA) = T_M$$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

As an example, if local codes require 10% outdoor air during occupied conditions, outdoor-air temperature is 60°F, and return-air temperature is 75°F.

$$(60 \times .10) + (75 \times .90) = 73.5^\circ\text{F}$$

2. Disconnect the mixed air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 14 and that the minimum position potentiometer is turned fully clockwise.
4. Connect 24 vac across terminals TR and TR1.
5. Carefully adjust the minimum position potentiometer until the measured mixed air temperature matches the calculated value.
6. Reconnect the mixed air sensor to terminals T and T1.

Remote control of the EconoMi\$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell part number S963B1128) is wired to the EconoMi\$er IV controller, the minimum position of the damper can be controlled from a remote location.

To control the minimum damper position remotely, remove the factory-installed jumper on the P and P1 terminals on the EconoMi\$er IV controller. Wire the field-supplied potentiometer to the P and P1 terminals on the EconoMi\$er IV controller. (See Fig. 21.)

Damper Movement

When the EconoMi\$er IV board receives initial power, it can take the damper up to 2½ minutes before it begins to position itself. After the initial positioning, subsequent changes to damper position will take up to 30 seconds to initiate. Damper movement from full open to full closed (or vice versa) takes 2½ minutes.

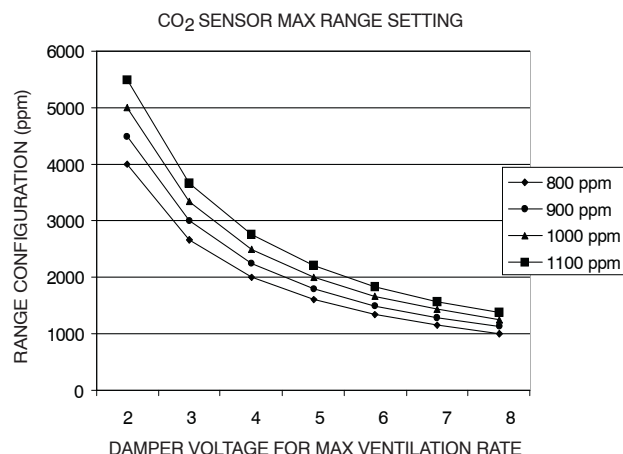


Fig. 24 – CO₂ Sensor Maximum Range Settings

Thermostats

The EconoMi\$er IV control works with conventional thermostats that have a Y1 (cool stage 1), Y2 (cool stage 2), W1 (heat stage 1), W2 (heat stage 2), and G (fan). The EconoMi\$er IV control does not support space temperature sensors. Connections are made at the thermostat terminal connection board located in the main control box.

Pressure Drop

See Fig. 25-28 for EconoMi\$er IV pressure drop. Evaporator fan may need to be adjusted.

Demand Control Ventilation

When using the EconoMi\$er IV for demand control ventilation, there are some equipment selection criteria which should be considered. When selecting the heat capacity and cool capacity of the equipment, the maximum ventilation rate must be evaluated for design conditions. The maximum damper position must be calculated to provide the desired fresh air.

Typically the maximum ventilation rate will be about 5 to 10% more than the typical cfm required per person, using normal outside air design criteria.

A proportional anticipatory strategy should be taken with the following conditions: a zone with a large area, varied occupancy, and equipment that cannot exceed the required ventilation rate at design conditions. Exceeding the required ventilation rate means the equipment can condition air at a maximum ventilation rate that is greater than the required ventilation rate for maximum occupancy. A proportional-anticipatory strategy will cause the fresh air supplied to increase as the room CO₂ level increases even though the CO₂ set point has not been reached. By the time the CO₂ level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO₂ sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside air entering the building for a given damper position. For best results there should be at least a 10 degree difference in outside and return-air temperatures.

$$(T_O \times OA) + (T_R \times RA) = T_M$$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

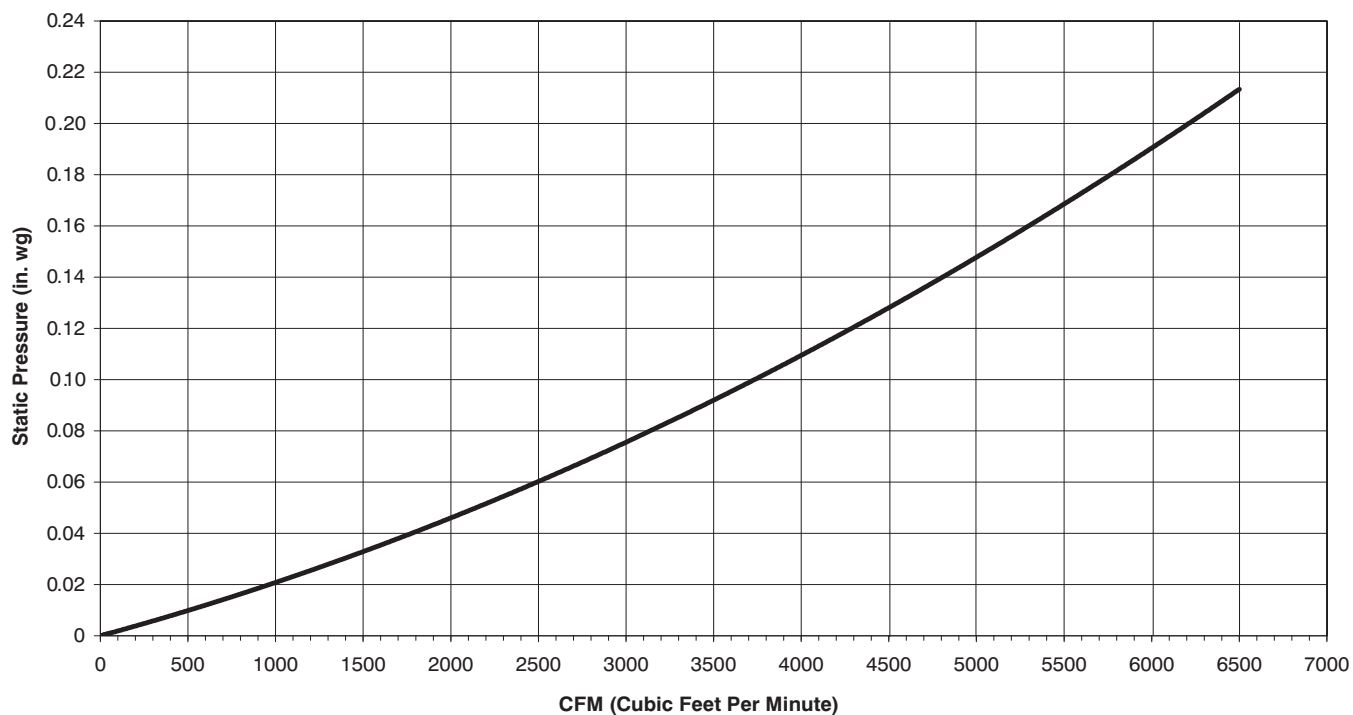
T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

Once base ventilation has been determined, set the minimum damper position potentiometer to the correct position.

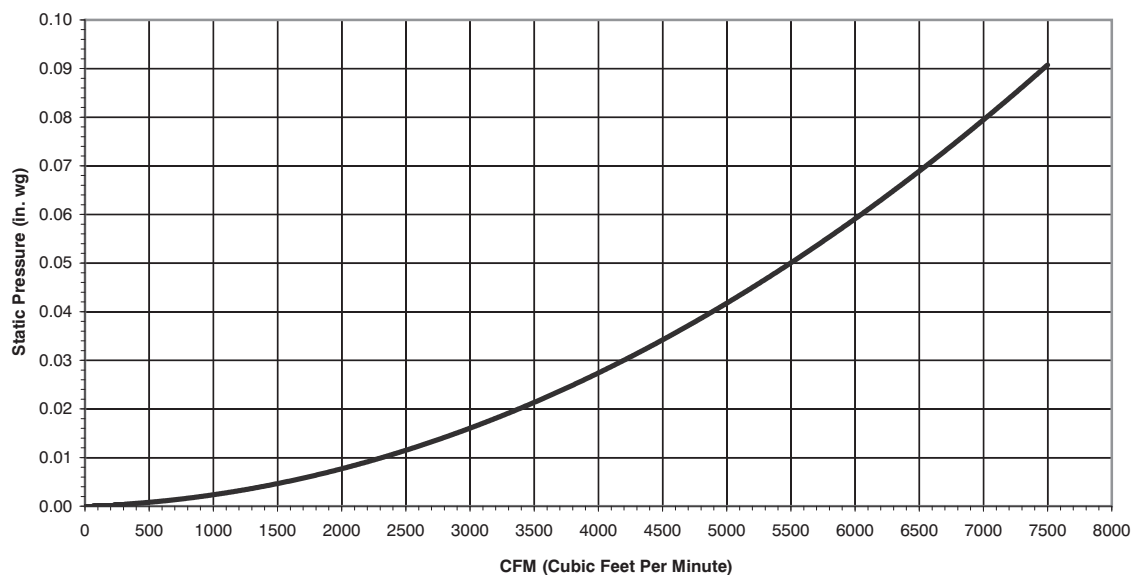
The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 24 to determine the maximum setting of the CO₂ sensor. For example, a 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 24 to find the point when the CO₂ sensor output will be 6.7 volts. Line up the point on the graph with the left side of the chart to determine that the range configuration for the CO₂ sensor should be 1800 ppm. The EconoMi\$er IV controller will output the 6.7 volts from the CO₂ sensor to the actuator when the CO₂ concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO₂ sensor voltage will be ignored by the EconoMi\$er IV controller until it rises above the 3.6 volt setting of the minimum position potentiometer.



NOTE: Economizer damper pressure drop is with outdoor air damper totally closed and return air damper fully open.

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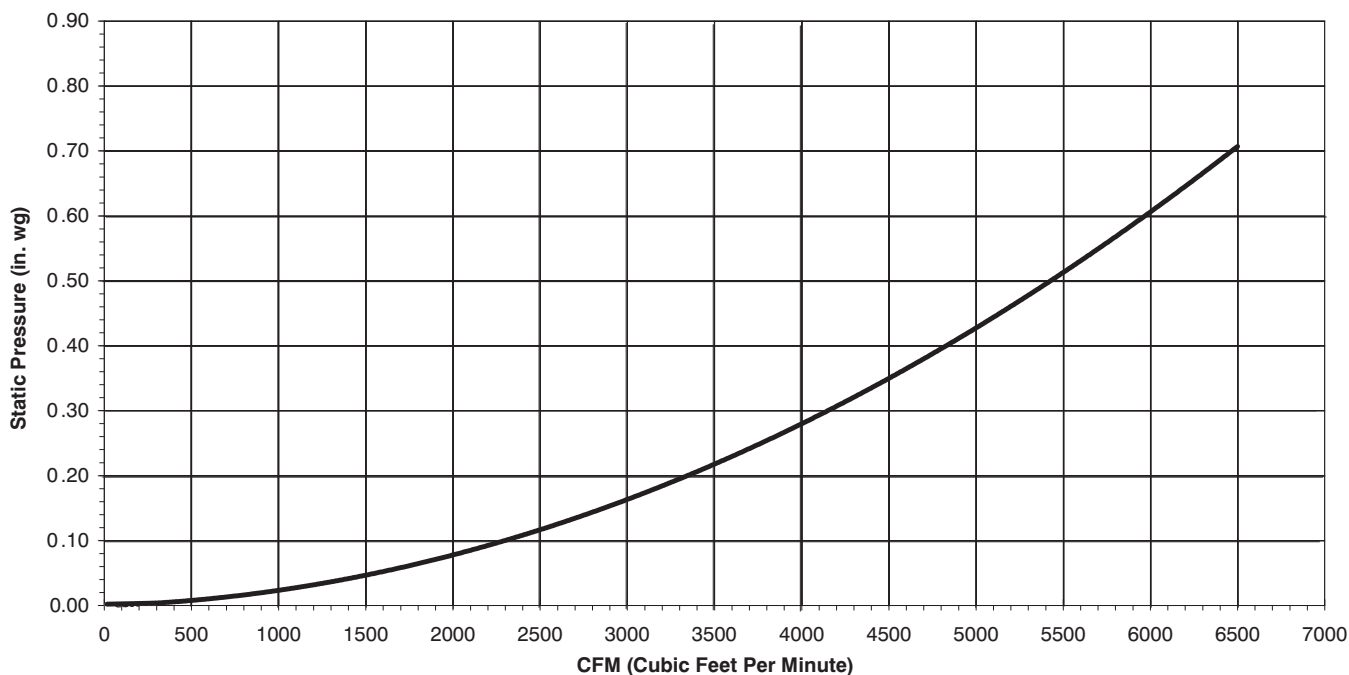
Fig. 25 – Pressure Drop for Vertical Economizer (50PG08-14)



NOTE: Economizer damper pressure drop is with outdoor air damper totally closed and return air damper fully open.

C06249

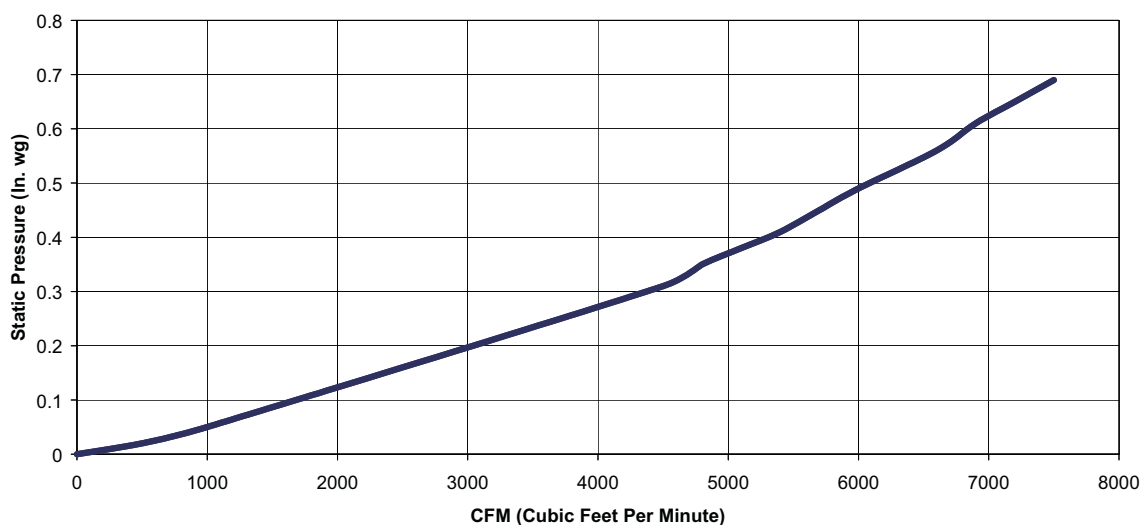
Fig. 26 – Pressure Drop for Vertical Economizer (50PG16)



NOTE: Economizer damper pressure drop is with outdoor air damper totally closed and return air damper fully open.

C06251

Fig. 27 – Pressure Drop for Horizontal Economizer (50PG08-14)



NOTE: Economizer damper pressure drop is with outdoor air damper totally closed and return air damper fully open.

C06181

Fig. 28 – Pressure Drop for Horizontal Economizer (50PG16)

Once the fully occupied damper position has been determined, set the maximum damper demand control ventilation potentiometer to this position. Do not set to the maximum position as this can result in over-ventilation to the space and potential high humidity levels.

CO₂ Sensor Configuration

The CO₂ sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. (See Table 6.)

Use setting 1 or 2 for Carrier equipment.

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to select the preset number. (See Table 6.)
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO₂ sensor can be changed anytime after the sensor is energized. Follow the steps below to change the non-standard settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to toggle to the NONSTD menu and press Enter.
4. Use the Up/Down button to toggle through each of the nine variables, starting with Altitude, until the desired setting is reached.
5. Press Mode to move through the variables.
6. Press Enter to lock in the selection, then press Mode to continue to the next variable.

Dehumidification of Fresh Air with DCV (Demand Controlled Ventilation) Control

Information from ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) indicates that the largest humidity load on any zone is the fresh air introduced. For some applications, a device such as a 62AQ energy recovery unit is added to reduce the moisture content of the fresh air being brought into the building when the enthalpy is high. In most cases, the normal heating and cooling processes are more than adequate to remove the humidity loads for most commercial applications.

This makes the control of the of the dehumidification device simple when using the enthalpy or differential enthalpy sensor. The enthalpy sensor or differential enthalpy sensor is installed on the equipment to determine economizer operation. The high enthalpy signal from the enthalpy sensor or differential enthalpy sensor can be used to turn on the outdoor air moisture removal device any time fresh air is required for the space.

The energy recovery device should be sized for maximum latent and sensible conditioning at maximum ventilation on a design day. A calculation for leaving-air temperature on a low ambient, low ventilation day should also be done to determine the mixed-air temperature of the return and pre-conditioned outside air. The design should produce an air temperature somewhat near room conditions to prevent reheat of the air mixture. The energy recovery device should be interlocked with the heat to turn off the device when in the heat mode.

Step 9 —Install All Accessories

After all of the factory-installed options have been adjusted, install all field- installed accessories. Refer to the accessory installation instructions included with each accessory. Consult the Carrier Price Pages or RTU (rooftop unit) Building software for accessory package numbers for particular applications. For applications with high outdoor air requirements, it is recommended that the outdoor filter accessory be used to eliminate water entrainment during rainfall.

Table 6—CO₂ Sensor Standard Settings

SETTING	EQUIPMENT	OUTPUT	VENTILATION RATE (cfm/Person)	ANALOG OUTPUT	CO ₂ CONTROL RANGE (ppm)	OPTIONAL RELAY SETPOINT (ppm)	RELAY HYSTERESIS (ppm)
1	Interface w/Standard Building Control System	Proportional	Any	0-10V 4-20 mA	0-2000	1000	50
2		Proportional	Any	2-10V 7-20 mA	0-2000	1000	50
3		Exponential	Any	0-10V 4-20 mA	0-2000	1100	50
4	Economizer	Proportional	15	0-10V 4-20 mA	0-1100	1100	50
5		Proportional	20	0-10V 4-20 mA	0- 900	900	50
6		Exponential	15	0-10V 4-20 mA	0-1100	1100	50
7		Exponential	20	0-10V 4-20 mA	0- 900	900	50
8	Health & Safety	Proportional	—	0-10V 4-20 mA	0-9999	5000	500
9	Parking/Air Intakes/ Loading Docks	Proportional	—	0-10V 4-20 mA	0-2000	700	50

PRE-START-UP



WARNING

ELECTRICAL OPERATION HAZARD

Failure to observe the following warnings could result in personal injury and/or death:

1. Follow recognized safety practices and wear protective goggles when checking or service refrigerant system.
2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
3. Do not remove compressor terminal cover until all electrical sources are disconnected and properly tagged.
4. Relieve all pressure from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals. Use accepted methods to recover refrigerant.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear protective goggles and proceed as follows:
 - a. Shut off electrical power to unit and install lockout tag.
 - b. Relieve all pressure from system using both high and low-pressure ports. Use accepted methods to recover refrigerant.
 - c. Cut component connection tubing with tubing cutter and remove component from unit.
 - d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to or shipped with unit.
3. Make the following inspections:
 - a. Inspect for shipping and handling damages such as broken lines, loose parts, or disconnected wires.
 - b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution.
 - c. Inspect all field-wiring and factory-wiring connections. Be sure that connections are completed and tight.
 - d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following:
 - a. Make sure that condenser-fan blades are correctly positioned in fan orifice. Refer to Condenser-Fan Adjustment section for more details.
 - b. Make sure that air filters are in place.

- c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
- d. Make sure that all tools and miscellaneous loose parts have been removed.
- e. Make sure that the start-up checklist has been performed and filled out.

NOTE: Ensure wiring does not contact any refrigerant tubing.

START-UP

Unit Preparation

Make sure that unit has been installed in accordance with these installation instructions and applicable codes.

Return-Air Filters

Make sure correct filters are installed in unit (see Tables 1A and 1B). Do not operate unit without return-air filters.

Outdoor-Air Inlet Screens

Outdoor-air inlet screens must be in place before operating unit.

Compressor Mounting

Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

Internal Wiring

Check all electrical connections in unit control boxes; tighten as required.

Refrigerant Service Ports

Each independent refrigerant system has a total of 4 Schrader-type service gage ports per circuit. One port is located on the suction line, one on the compressor discharge line, and 2 on the liquid line on both sides of the filter drier. Be sure that caps on the ports are tight.

Crankcase Heaters

Crankcase heaters are energized if compressor B1 is not operating.

High Flow Refrigerant

Three high flow refrigerant valves are located on the compressor hot gas tube, suction tube, and the liquid line leaving the condenser. Large black plastic caps distinguish these valves with o-rings located inside the caps. These valves can not be accessed for service in the field. Ensure the plastic caps are in place and tight or the possibility of refrigerant leakage could occur.

Compressor Rotation

On 3-phase units, it is important to be certain the scroll compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit and install lockout tag.
3. Reverse any two of the unit power leads.
4. Turn on power to the unit.

The suction and discharge pressure levels should now move to their normal start-up levels.

NOTE: When the compressor is rotating in the wrong direction, the unit makes an elevated level of noise and does not provide heating or cooling.



CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment.

Compressor damage will occur if rotation is not immediately corrected.

Evaporator Fan

Fan belt and variable pitch pulleys are factory-installed. See Tables 7-16 for fan performance data. Be sure that fans rotate in the proper direction. See Table 17 for air quantity limits. See Table 18 for evaporator fan motor specifications. See Table 19 for fan rpm at various motor pulley settings. To alter fan performance, see Evaporator Fan Performance Adjustment section. See Table 20 for accessory electric heat static pressure.

Cooling

To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch at AUTO position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Refrigerant Charge section.

Reset thermostat at a position above room temperature. Compressor will shut off.

To Shut Off Unit

Set system selector switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting. Units are equipped with Cycle-LOC™ protection device. Unit shuts down on any safety trip and remains off; an indicator light on the thermostat comes on. Check reason for safety trip.

Compressor restart is accomplished by manual reset at the thermostat by turning the selector switch to OFF position and then ON position.

Heating If Accessory Heater is Installed)

To start unit, turn on main power supply.

Set thermostat at HEAT position and a setting above room temperature, and set fan at AUTO position.

First stage of thermostat energizes the first-stage electric heater elements; second stage energizes second-stage electric heater elements. Check heating effects at air supply grille(s).

If accessory electric heaters do not energize, reset limit switch (located on evaporator-fan scroll) by pressing button located between terminals on the switch.

To Shut Off Unit

Set system selector switch at OFF position. Resetting heating selector lever below room temperature temporarily shuts unit off until space temperature falls below thermostat setting.

Safety Relief

A soft solder joint in the suction line at the loss-of-charge/low-pressure switch fitting provides pressure relief under abnormal temperature and pressure conditions.

Ventilation (Continuous Fan)

Set fan and system selector switches at ON and OFF positions, respectively. Evaporator fan operates continuously to provide constant air circulation.

Operating Sequence

Cooling, Units With Economizer

When the thermostat calls for one stage of cooling, Y1 and G are energized. The indoor-fan contactor (IFC) and compressor contactor(s) (C.A1 and C.B1 on three compressor units or C.A1 only on two-compressor units), and outdoor fan contactors (OFC1 and OFC2 when outdoor temperature is above LTS [low temperature switch] setting) are energized and the indoor-fan motor, compressor(s) (A1 and B1 on three-compressor units or A1 only on two-compressor units), and outdoor fans controlled by OFC1 are started. If the outdoor temperature is above the setting of the low temperature switch, the outdoor fans controlled by OFC2 are also started.

If more cooling is required, the thermostat will call for a second stage of cooling, energizing Y2. This will allow relay CR1 to energize, which in turn energizes the compressor contactor (C.C1 on three compressor units or C.B1 on two-compressor units). The second stage compressor (C1 on three-compressor units or B1 on two-compressor units) is then started.

Heating, Units Without Economizer

NOTE: The 50PG08-16 units have 2 stages of electric heat.

When the thermostat calls for one stage of heating, W1 is energized. The thermostat must be configured such that the blower output (G) is energized when there is a W1 call for heating. The indoor fan contactor (IFC) and first-stage electric heat contactor(s) are energized and the indoor-fan motor, and first stage electric heater are started.

If additional heating is required, the thermostat will call for a second-stage of heating, energizing W2. This will energize the second stage of electric heat.

Cooling, Units With Economi\$er IV

When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the Economi\$er IV control to provide a 50 to 55°F mixed-air temperature into the zone. As the mixed-air temperature fluctuates above 55° or below 50°F, the dampers will be modulated (open or close) to bring the mixed-air temperature back within control.

If the load is high and Y2 is energized, then the first stage of mechanical cooling will be used to supplement the free cooling provided by the economizer. If mechanical cooling is utilized with free cooling, the outdoor-air damper will maintain its current position at the time the compressor is started. If the increase in cooling capacity causes the mixed-air temperature to drop below 45°F, then the outdoor-air damper position will be decreased to the minimum position. If the mixed air temperature continues to fall, the outdoor-air damper will close. Control returns to normal once the mixed-air temperature rises above 48°F.

If optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and deenergized if the position goes above or below the power exhaust set point. When the exhaust fan is required to be on, the LED on the control will be energized.

If field-installed accessory CO₂ sensors are connected to the Economi\$er IV control, a demand controlled ventilation strategy will begin to operate. As the CO₂ level in the zone increases above the CO₂ set point, the minimum position of the damper will be increased proportionally from the minimum damper position to the maximum demand ventilation damper position. As the CO₂ level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

If there is no G signal then the control will drive the damper to the fully closed position.

The control is also equipped with an occupied/unoccupied input. If the input is closed, then the damper will be driven to the minimum position when G is energized. If the input is open then the damper will remain in the fully closed position unless there is a demand for free cooling of DCV ventilation.

On the initial power to the Economi\$er IV control, it will take the damper up to 2¹/₂ minutes before it begins to position itself. Any change in damper position will take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between 1¹/₂ to 2¹/₂ minutes.

If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), then the control will modulate the dampers open to maintain the mixed air temperature set point at 50 to 55°F.

If there is a further demand for cooling (cooling second stage — Y2 is energized), then the control will bring on compressor stage 1 to maintain the mixed air temperature set point. The Economi\$er IV damper will be open at maximum position. Economi\$er IV operation is limited to a single compressor.

Heating, Units With Economi\$er IV

When the room temperature calls for heat, the heating controls are energized as described in the Heating, Units Without Economizer section. The IFM is energized and the Economi\$er IV damper modulates to the minimum position. When the thermostat is satisfied, the damper modulates closed.

Table 7—Fan Performance — 50PG08 Vertical Units

AIRFLOW (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	439	0.32	519	0.43	592	0.54	659	0.66	721	0.79
2400	455	0.37	532	0.48	602	0.60	667	0.73	728	0.86
2550	471	0.43	546	0.55	613	0.67	676	0.80	735	0.94
2700	488	0.49	560	0.61	625	0.74	686	0.88	743	1.02
2850	505	0.56	574	0.69	638	0.82	697	0.96	753	1.11
3000	522	0.63	589	0.77	651	0.91	708	1.05	763	1.21
3150	539	0.71	605	0.86	664	1.00	720	1.15	773	1.31
3300	557	0.80	620	0.95	679	1.10	733	1.26	785	1.42
3450	575	0.90	636	1.06	693	1.21	746	1.37	797	1.54
3600	593	1.00	653	1.17	708	1.33	760	1.50	809	1.67
3750	611	1.12	669	1.29	723	1.46	774	1.63	822	1.81

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	780	0.92	836	1.06	889	1.21	940	1.35	989	1.51
2400	785	1.00	840	1.14	892	1.29	942	1.44	990	1.60
2550	791	1.08	845	1.23	896	1.38	945	1.54	993	1.70
2700	798	1.17	851	1.32	901	1.48	949	1.64	996	1.81
2850	806	1.26	857	1.42	906	1.58	954	1.75	999	1.92
3000	815	1.36	865	1.52	913	1.69	959	1.86	1004	2.04
3150	824	1.47	873	1.64	920	1.81	965	1.99	1009	2.17
3300	834	1.59	882	1.76	928	1.94	972	2.12	1015	2.30
3450	845	1.71	891	1.89	936	2.07	980	2.26	1022	2.45
3600	856	1.85	902	2.03	946	2.21	988	2.40	1030	2.60
3750	868	1.99	912	2.17	955	2.36	997	2.56	1038	2.76

LEGEND

Bhp – Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See General Fan Performance Notes.

Table 8—Fan Performance — 50PG09 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	471	0.43	546	0.55	613	0.67	676	0.80	735	0.94
2700	488	0.49	560	0.61	625	0.74	686	0.88	743	1.02
2850	505	0.56	574	0.69	638	0.82	697	0.96	753	1.11
3000	522	0.63	589	0.77	651	0.91	708	1.05	763	1.21
3150	539	0.71	605	0.86	664	1.00	720	1.15	773	1.31
3300	557	0.80	620	0.95	679	1.10	733	1.26	785	1.42
3450	575	0.90	636	1.06	693	1.21	746	1.37	797	1.54
3600	593	1.00	653	1.17	708	1.33	760	1.50	809	1.67
3750	611	1.12	669	1.29	723	1.46	774	1.63	822	1.81
3900	630	1.24	686	1.41	739	1.59	788	1.77	835	1.95
4050	648	1.37	703	1.55	754	1.73	803	1.92	849	2.11
4200	667	1.51	721	1.70	771	1.89	818	2.08	863	2.27

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	791	1.08	845	1.23	896	1.38	945	1.54	993	1.70
2700	798	1.17	851	1.32	901	1.48	949	1.64	996	1.81
2850	806	1.26	857	1.42	906	1.58	954	1.75	999	1.92
3000	815	1.36	865	1.52	913	1.69	959	1.86	1004	2.04
3150	824	1.47	873	1.64	920	1.81	965	1.99	1009	2.17
3300	834	1.59	882	1.76	928	1.94	972	2.12	1015	2.30
3450	845	1.71	891	1.89	936	2.07	980	2.26	1022	2.45
3600	856	1.85	902	2.03	946	2.21	988	2.40	1030	2.60
3750	868	1.99	912	2.17	955	2.36	997	2.56	1038	2.76
3900	880	2.14	924	2.33	966	2.52	1007	2.72	1047	2.93
4050	893	2.30	936	2.49	977	2.70	1017	2.90	1056	3.11
4200	906	2.47	948	2.67	988	2.88	1028	3.09	1066	3.30

LEGEND

Bhp – Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Table 9—Fan Performance — 50PG012 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	533	0.65	599	0.79	660	0.93	717	1.08	771	1.23
3200	557	0.77	620	0.91	679	1.06	734	1.21	786	1.37
3400	581	0.90	642	1.05	699	1.21	751	1.37	802	1.53
3600	606	1.04	665	1.20	719	1.36	770	1.53	819	1.71
3800	631	1.20	687	1.37	740	1.54	789	1.71	837	1.89
4000	656	1.37	711	1.55	761	1.73	809	1.91	855	2.10
4200	682	1.56	734	1.75	783	1.94	830	2.13	874	2.32
4400	707	1.77	758	1.96	806	2.16	851	2.36	894	2.57
4600	733	1.99	782	2.20	828	2.41	872	2.62	914	2.83
4800	759	2.24	806	2.45	851	2.67	894	2.89	935	3.11
5000	785	2.50	831	2.73	875	2.95	916	3.18	956	3.41

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	822	1.39	872	1.55	920	1.72	966	1.89	1011	2.07
3200	836	1.54	884	1.71	930	1.88	975	2.06	1019	2.24
3400	850	1.70	897	1.88	942	2.06	985	2.24	1028	2.43
3600	866	1.88	911	2.06	955	2.25	997	2.44	1038	2.64
3800	882	2.08	926	2.27	968	2.46	1010	2.66	1050	2.86
4000	899	2.29	942	2.49	983	2.69	1023	2.89	1063	3.10
4200	917	2.52	959	2.72	999	2.93	1038	3.14	1076	3.36
4400	936	2.77	976	2.98	1015	3.19	1054	3.41	1091	3.63
4600	955	3.04	994	3.26	1033	3.48	1070	3.70	—	—
4800	975	3.33	1013	3.55	—	—	—	—	—	—
5000	995	3.63	—	—	—	—	—	—	—	—

LEGEND

Bhp – Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See General Fan Performance Notes.

Table 10—Fan Performance — 50PG014 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	625	1.15	682	1.32	735	1.49	785	1.67	832	1.85
3950	650	1.32	705	1.50	756	1.68	804	1.86	851	2.05
4150	675	1.51	728	1.70	778	1.88	825	2.07	870	2.27
4350	701	1.71	752	1.91	800	2.11	846	2.30	889	2.50
4550	727	1.93	776	2.14	823	2.34	867	2.55	909	2.76
4750	753	2.17	800	2.39	846	2.60	889	2.82	930	3.03
4950	779	2.43	825	2.66	869	2.88	911	3.10	951	3.33
5150	805	2.71	850	2.95	892	3.18	933	3.41	972	3.64
5350	831	3.01	875	3.26	916	3.50	956	3.74	994	3.98
5550	858	3.34	900	3.59	940	3.84	979	4.09	1016	4.34
5750	884	3.68	925	3.95	965	4.21	1002	4.47	1039	4.73
5950	911	4.05	951	4.33	989	4.60	1026	4.86	1062	5.13
6150	938	4.45	976	4.73	1014	5.01	—	—	—	—
6250	951	4.66	989	4.94	1026	5.23	—	—	—	—

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	878	2.03	922	2.22	965	2.41	1006	2.60	1047	2.80
3950	895	2.24	938	2.43	979	2.63	1020	2.83	1059	3.04
4150	913	2.46	954	2.66	995	2.87	1034	3.08	1073	3.29
4350	931	2.71	972	2.91	1011	3.13	1050	3.34	1087	3.56
4550	950	2.97	990	3.18	1028	3.40	1066	3.63	1102	3.85
4750	970	3.25	1008	3.47	1046	3.70	1082	3.93	1118	4.16
4950	990	3.56	1028	3.79	1064	4.02	1100	4.25	1135	4.49
5150	1010	3.88	1047	4.12	1083	4.36	1118	4.60	1152	4.85
5350	1031	4.23	1067	4.47	1102	4.72	1136	4.97	1170	5.22
5550	1053	4.59	1088	4.85	1122	5.10	—	—	—	—
5750	1074	4.99	1109	5.25	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp – Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See General Fan Performance Notes.

Table 11—Fan Performance — 50PG016 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	540	0.71	640	1.03	718	1.36	784	1.68	844	2.00
4800	560	0.82	660	1.15	737	1.50	803	1.85	862	2.19
5100	581	0.94	680	1.29	757	1.66	823	2.03	881	2.40
5400	602	1.08	699	1.43	776	1.83	842	2.22	900	2.61
5700	623	1.24	719	1.59	796	2.01	862	2.42	919	2.84
6000	645	1.42	739	1.77	816	2.20	881	2.64	939	3.08
6300	667	1.62	760	1.96	836	2.40	901	2.86	958	3.33
6600	689	1.84	780	2.17	856	2.63	921	3.10	978	3.59
6900	712	2.09	800	2.40	876	2.86	940	3.36	998	3.87
7200	735	2.36	821	2.65	896	3.12	960	3.63	1017	4.16
7500	758	2.66	842	2.93	916	3.39	980	3.92	1037	4.47

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	898	2.32	949	2.63	998	2.95	1043	3.27	1087	3.59
4800	916	2.53	967	2.87	1014	3.21	1060	3.55	1103	3.89
5100	935	2.76	985	3.12	1032	3.48	1076	3.84	1119	4.20
5400	953	3.00	1003	3.38	1050	3.76	1094	4.14	1136	4.52
5700	972	3.25	1022	3.65	1068	4.05	1112	4.46	1153	4.86
6000	992	3.51	1040	3.94	1086	4.36	1130	4.79	1171	5.21
6300	1011	3.78	1059	4.23	1105	4.68	1148	5.13	1189	5.58
6600	1030	4.07	1079	4.55	1124	5.02	1167	5.49	1208	5.96
6900	1050	4.37	1098	4.87	1143	5.37	1186	5.86	1226	6.35
7200	1069	4.68	1117	5.21	1162	5.73	1205	6.25	1245	6.76
7500	1089	5.02	1137	5.56	1182	6.11	1224	6.65	1264	7.19

LEGEND

Bhp — Brake Horsepower

 Mid–Low Range Motor/Drive Required

 High Range Motor/Drive Required

NOTES: 1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid–low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
 2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid–low range motor/drive, and 7.50 for high range motor/drive.
 3. See General Fan Performance Notes.

Table 12—Fan Performance — 50PG08 Horizontal Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	381	0.26	469	0.36	546	0.47	616	0.58	682	0.71
2400	395	0.30	480	0.41	555	0.52	623	0.64	686	0.77
2550	408	0.34	491	0.46	564	0.58	630	0.70	691	0.83
2700	422	0.39	503	0.51	573	0.64	638	0.77	698	0.91
2850	437	0.45	515	0.58	583	0.71	646	0.84	705	0.98
3000	451	0.51	527	0.64	594	0.78	655	0.92	712	1.07
3150	466	0.57	540	0.72	605	0.86	665	1.00	721	1.15
3300	481	0.64	553	0.79	617	0.94	675	1.09	730	1.25
3450	496	0.72	566	0.88	628	1.03	686	1.19	739	1.35
3600	512	0.80	579	0.97	640	1.13	696	1.29	749	1.46
3750	527	0.89	593	1.07	653	1.24	708	1.41	759	1.58

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	743	0.84	801	0.97	856	1.11	908	1.26	958	1.41
2400	746	0.90	803	1.04	857	1.19	908	1.34	957	1.49
2550	750	0.97	805	1.12	858	1.27	909	1.42	958	1.58
2700	755	1.05	809	1.20	861	1.35	911	1.51	958	1.67
2850	760	1.13	813	1.28	864	1.44	913	1.60	960	1.77
3000	767	1.22	818	1.37	868	1.54	916	1.70	962	1.88
3150	774	1.31	824	1.47	873	1.64	920	1.81	966	1.99
3300	781	1.41	831	1.58	879	1.75	925	1.92	969	2.11
3450	790	1.52	838	1.69	885	1.86	930	2.04	974	2.23
3600	799	1.63	846	1.81	892	1.99	936	2.17	979	2.36
3750	808	1.75	854	1.93	899	2.12	943	2.31	985	2.50

LEGEND

Bhp – Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.

2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.

3. See General Fan Performance Notes.

Table 13—Fan Performance — 50PG09 Horizontal Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	408	0.34	491	0.46	564	0.58	630	0.70	691	0.83
2700	422	0.39	503	0.51	573	0.64	638	0.77	698	0.91
2850	437	0.45	515	0.58	583	0.71	646	0.84	705	0.98
3000	451	0.51	527	0.64	594	0.78	655	0.92	712	1.07
3150	466	0.57	540	0.72	605	0.86	665	1.00	721	1.15
3300	481	0.64	553	0.79	617	0.94	675	1.09	730	1.25
3450	496	0.72	566	0.88	628	1.03	686	1.19	739	1.35
3600	512	0.80	579	0.97	640	1.13	696	1.29	749	1.46
3750	527	0.89	593	1.07	653	1.24	708	1.41	759	1.58
3900	543	0.99	607	1.17	665	1.35	719	1.52	770	1.70
4050	559	1.09	621	1.28	678	1.47	731	1.65	780	1.83
4200	575	1.20	635	1.40	691	1.59	743	1.78	792	1.97

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	750	0.97	805	1.12	858	1.27	909	1.42	958	1.58
2700	755	1.05	809	1.20	861	1.35	911	1.51	958	1.67
2850	760	1.13	813	1.28	864	1.44	913	1.60	960	1.77
3000	767	1.22	818	1.37	868	1.54	916	1.70	962	1.88
3150	774	1.31	824	1.47	873	1.64	920	1.81	966	1.99
3300	781	1.41	831	1.58	879	1.75	925	1.92	969	2.11
3450	790	1.52	838	1.69	885	1.86	930	2.04	974	2.23
3600	799	1.63	846	1.81	892	1.99	936	2.17	979	2.36
3750	808	1.75	854	1.93	899	2.12	943	2.31	985	2.50
3900	817	1.88	863	2.07	907	2.26	950	2.45	991	2.65
4050	827	2.02	872	2.21	916	2.40	958	2.60	998	2.80
4200	838	2.16	882	2.36	925	2.56	966	2.76	1006	2.97

LEGEND

Bhp – Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.

2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.

3. See General Fan Performance Notes.

50PG08 – 16

Table 14—Fan Performance — 50PG012 Horizontal Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	464	0.53	538	0.66	604	0.80	664	0.94	721	1.09
3200	484	0.62	556	0.77	619	0.91	678	1.06	733	1.21
3400	505	0.72	574	0.88	636	1.03	692	1.19	746	1.35
3600	526	0.84	593	1.00	652	1.17	708	1.33	759	1.50
3800	548	0.96	611	1.14	670	1.31	723	1.48	774	1.66
4000	569	1.10	631	1.29	687	1.47	739	1.65	789	1.83
4200	591	1.25	650	1.45	705	1.64	756	1.83	804	2.02
4400	613	1.42	670	1.63	723	1.83	773	2.03	820	2.23
4600	635	1.60	690	1.82	742	2.03	790	2.24	836	2.44
4800	657	1.80	710	2.02	761	2.24	808	2.46	853	2.68
5000	680	2.01	731	2.24	780	2.48	826	2.70	870	2.93

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	775	1.24	826	1.40	876	1.56	923	1.73	969	1.90
3200	785	1.37	835	1.53	883	1.70	929	1.88	974	2.06
3400	796	1.51	845	1.68	892	1.86	937	2.04	981	2.22
3600	809	1.67	856	1.84	901	2.03	945	2.21	988	2.40
3800	822	1.84	868	2.02	912	2.21	955	2.40	996	2.59
4000	835	2.02	880	2.21	923	2.40	965	2.60	1006	2.80
4200	850	2.21	893	2.41	936	2.61	976	2.81	1016	3.02
4400	865	2.43	907	2.63	949	2.84	988	3.05	1027	3.26
4600	880	2.65	922	2.86	962	3.08	1001	3.29	1039	3.51
4800	896	2.89	937	3.11	976	3.33	1014	3.56	—	—
5000	912	3.15	952	3.38	991	3.61	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
 2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
 3. See General Fan Performance Notes.

Table 15—Fan Performance — 50PG014 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	542	0.93	607	1.10	665	1.27	719	1.44	770	1.62
3950	564	1.07	626	1.25	683	1.43	735	1.61	785	1.79
4150	586	1.22	645	1.41	701	1.60	752	1.78	800	1.97
4350	608	1.38	665	1.58	719	1.78	769	1.98	816	2.17
4550	630	1.55	685	1.77	737	1.98	786	2.18	832	2.39
4750	652	1.75	705	1.97	756	2.19	804	2.40	849	2.62
4950	674	1.95	726	2.19	775	2.42	822	2.64	866	2.86
5150	697	2.18	747	2.42	794	2.66	840	2.89	883	3.13
5350	719	2.42	767	2.67	814	2.92	858	3.16	901	3.41
5550	742	2.67	789	2.94	834	3.20	877	3.45	918	3.70
5750	765	2.95	810	3.22	854	3.49	896	3.76	936	4.02
5950	788	3.24	831	3.53	874	3.81	915	4.08	955	4.36
6150	811	3.56	853	3.85	894	4.14	935	4.43	973	4.71
6250	822	3.72	864	4.02	905	4.32	944	4.61	983	4.89

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	818	1.79	865	1.97	909	2.16	952	2.35	994	2.54
3950	832	1.97	877	2.16	920	2.35	963	2.55	1003	2.75
4150	846	2.16	890	2.36	932	2.56	974	2.76	1014	2.97
4350	861	2.37	904	2.57	945	2.78	985	2.99	1024	3.20
4550	876	2.59	918	2.80	959	3.02	998	3.23	1036	3.45
4750	892	2.83	933	3.05	973	3.27	1011	3.49	1049	3.72
4950	908	3.09	948	3.31	987	3.54	1025	3.77	1061	4.00
5150	924	3.36	964	3.59	1002	3.83	1039	4.06	1075	4.30
5350	941	3.65	980	3.89	1017	4.13	1054	4.38	1089	4.62
5550	958	3.96	996	4.21	1033	4.46	1069	4.71	1103	4.96
5750	975	4.28	1013	4.54	1049	4.80	1084	5.06	—	—
5950	993	4.63	1030	4.89	1065	5.16	—	—	—	—
6150	1011	4.99	—	—	—	—	—	—	—	—
6250	1020	5.18	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES: 1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
 2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
 3. See General Fan Performance Notes.

Table 16—Fan Performance — 50PG016 Horizontal Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	592	0.87	670	1.16	732	1.43	787	1.70	837	1.97
4800	619	1.01	696	1.32	758	1.62	812	1.91	861	2.20
5100	647	1.17	723	1.50	784	1.82	838	2.13	886	2.44
5400	675	1.34	750	1.70	810	2.04	863	2.37	911	2.70
5700	704	1.54	776	1.91	837	2.27	889	2.63	936	2.97
6000	733	1.75	804	2.14	863	2.53	915	2.91	962	3.27
6300	762	1.99	831	2.40	890	2.80	941	3.20	988	3.59
6600	792	2.25	858	2.67	917	3.10	968	3.52	1014	3.93
6900	822	2.53	886	2.97	944	3.42	994	3.86	1040	4.29
7200	852	2.84	914	3.29	971	3.76	1021	4.22	1066	4.68
7500	882	3.17	942	3.63	998	4.12	1048	4.61	1093	5.09

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	884	2.25	929	2.52	972	2.80	1014	3.09	1054	3.38
4800	907	2.49	951	2.78	992	3.07	1033	3.37	1072	3.68
5100	931	2.74	973	3.05	1014	3.36	1053	3.68	1091	3.99
5400	955	3.02	997	3.35	1036	3.67	1075	4.00	1112	4.33
5700	980	3.32	1021	3.66	1060	4.00	1097	4.35	1133	4.70
6000	1005	3.64	1045	4.00	1084	4.36	1120	4.72	1156	5.08
6300	1030	3.98	1070	4.35	1108	4.73	1144	5.11	1179	5.49
6600	1056	4.34	1095	4.74	1133	5.13	1168	5.53	1203	5.93
6900	1082	4.72	1121	5.14	1158	5.56	1193	5.97	1227	6.39
7200	1108	5.13	1147	5.57	1183	6.00	1218	6.44	1252	6.87
7500	1134	5.56	1173	6.02	1209	6.48	1244	6.93	1277	7.38

LEGEND

Bhp — Brake Horsepower

Mid—Low Range Motor/Drive Required

High Range Motor Required

NOTES: 1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid—low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid—low range motor/drive, and 7.50 for high range motor/drive.
3. See General Fan Performance Notes.

GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES

- Values include losses for filters, unit casing, and wet coils. See unit Product Data for accessory/FIOP static pressure information.
- Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using the fan motors up to the bhp ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Table 18 (Evaporator-Fan Motor Specifications) for additional information.
- Use of a field-supplied motor may affect wire size. Contact the local Carrier representative for details.
- Interpolation is permissible. Do not extrapolate. (Belt drive units only).

50PG08—16

Table 17—Operation Air Quantity Limits

UNIT 50PG	COOLING (cfm)		HEATING (cfm) ELECTRIC HEAT	
	Min	Max	Min	Max
08	2250	3750	2250	3750
09	2550	4250	2550	4250
12	3000	5000	3000	5000
14	3750	6250	3750	6250
16	4500	7500	4500	7500

Table 18—Evaporator Fan Motor Specifications

50PG	DRIVE	VOLTAGE/PHASE	MOTOR P/N	EFFICIENCY	MAX BHP	MAX AMPS
08	Low	208/3ph	HD56FE652	0.80	2.4	6.4
		230/3ph	HD56FE652	0.80	2.4	6.4
		460/3ph	HD56FE652	0.80	2.4	3.2
		575/3ph	HD56FE575	0.80	2.4	2.4
	High	208/3ph	HD58FE653	0.84	3.1	8.8
		230/3ph	HD58FE653	0.84	3.1	8.8
		460/3ph	HD58FE653	0.84	3.1	4.4
		575/3ph	HD58FE576	0.84	3.1	3.9
09	Low	208/3ph	HD56FE652	0.80	2.4	6.4
		230/3ph	HD56FE652	0.80	2.4	6.4
		460/3ph	HD56FE652	0.80	2.4	3.2
		575/3ph	HD56FE575	0.80	2.4	2.4
	High	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE575	0.83	3.7	4.2
12	Low	208/3ph	HD58FE653	0.84	3.1	8.8
		230/3ph	HD58FE653	0.84	3.1	8.8
		460/3ph	HD58FE653	0.84	3.1	4.4
		575/3ph	HD58FE576	0.84	3.1	3.9
	High	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE575	0.83	3.7	4.2
14	Low	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE575	0.83	3.7	4.2
	High	208/3ph	HD60FK650	0.81	5.25	14.8
		230/3ph	HD60FK650	0.81	5.25	14.8
		460/3ph	HD60FK650	0.81	5.25	7.4
		575/3ph	HD60FE575	0.81	5.25	5.9
16	Low	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE576	0.83	3.7	4.2
	Mid-Low	208/3ph	HD60FK650	0.81	5.25	14.8
		230/3ph	HD60FK650	0.81	5.25	14.8
		460/3ph	HD60FK650	0.81	5.25	7.4
		575/3ph	HD60FE575	0.81	5.25	5.9
	High	208/3ph	HD62FL650	0.89	7.5	19.4
		230/3ph	HD62FL650	0.89	7.5	19.4
		460/3ph	HD62FL650	0.89	7.5	9.7
		575/3ph	HD62FL575	0.81	7.5	7.8

NOTES:

- Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
- Convert bhp to watts using the following formula:

$$\text{watts} = \frac{\text{bhp (746)}}{\text{motor efficiency}}$$

- The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT-compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements. Therefore, the indoor fan motors for Carrier 50PG units are exempt from these requirements.

Guide Specification for AC-1:3

Project: Interior Renovation B8317 IDRC
Prepared By:

03/15/2011
09:54AM

Unit A

Operation and Maintenance Manuals

(NASA VAFB 840, SD-10, Item: Operation and Maintenance Manuals, Paragraph 3.2)

Table 19—Fan Rpm at Motor Pulley Settings*

UNIT 50PG	DRIVE	MOTOR PULLEY TURNS OPEN										
		0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
08	Low	771	751	731	710	690	670	649	629	609	589	568
	High	1015	994	974	954	934	913	893	873	852	832	812
09	Low	771	751	731	710	690	670	649	629	609	589	568
	High	1015	994	974	954	934	913	893	873	852	832	812
12	Low	893	873	852	832	812	791	771	751	731	710	690
	High	1055	1035	1015	994	974	954	934	913	893	873	852
14	Low	893	873	852	832	812	791	771	751	731	710	690
	High	1055	1035	1015	994	974	954	934	913	893	873	852
16	Low	879	863	846	829	812	795	778	761	744	727	710
	Mid-Low	1066	1047	1027	1008	988	969	950	930	911	892	872
	High	1260	1240	1221	1202	1182	1163	1144	1124	1105	1085	1066

*Approximate fan rpm shown, based on 1725 rpm motor.

NOTE: Factory pulley speed setting is at 5 turns open for sizes 08-14 and 2 turns open for size 16.

Table 20—Accessory/FIOP Electric Heat Static Pressure (in. wg)

50PG08-14		50PG16	
AIRFLOW (Cfm)	PRESSURE DROP (in. wg)	AIRFLOW (Cfm)	PRESSURE DROP (in. wg)
2250	0.03	4500	0.02
2650	0.05	4800	0.02
3050	0.06	5100	0.03
3450	0.08	5400	0.03
3850	0.10	5700	0.04
4250	0.12	6000	0.04
4650	0.14	6300	0.05
5050	0.17	6600	0.06
5450	0.20	6900	0.07
5850	0.23	7200	0.07
6250	0.26	7500	0.08

SERVICE

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on unit, turn off main power switch to unit.

⚠ CAUTION

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this caution may result in personal injury or equipment damage.

Puron® (R-410A) refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment. If service equipment is not rated for Puron refrigerant, equipment damage or personal injury may result.

Cleaning

Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit top panel and/or side panels for access to unit interior.

Coil Maintenance and Cleaning Recommendation

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the coil.

Remove Surface Loaded Fibers

Surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft non-metallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges can be easily bent over and damage to the coating of a protected coil) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Periodic Clean Water Rinse

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described below is recommended.

Routine Cleaning of Coil Surfaces

Monthly cleaning with Totaline® environmentally sound coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement parts division as part number P902-0301 for a one gallon container, and part number P902-0305 for a 5 gallon container. It is recommended that all coils, including standard aluminum, pre-coated, copper/copper or E-coated coils be cleaned with the Totaline environmentally sound coil cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid the use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline environmentally sound coil cleaner is non-flammable, hypoallergenic, nonbacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

Totaline® Environmentally Sound Coil Cleaner Application Equipment

- 2½ gallon garden sprayer
- water rinse with low velocity spray nozzle

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Harsh chemicals, household bleach or acid or basic cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Totaline environmentally sound coil cleaner as described above.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in reduced unit performance.

High velocity water from a pressure washer, garden hose, or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdown may occur.

Totaline Environmentally Sound Coil Cleaner Application Instructions

1. Proper eye protection such as safety glasses is recommended during mixing and application.
2. Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline environmentally sound coil cleaner in a 2½ gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100°F.

NOTE: Do NOT USE water in excess of 130°F, as the enzymatic activity will be destroyed.

5. Thoroughly apply Totaline environmentally sound coil cleaner solution to all coil surfaces including finned area, tube sheets and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in horizontal pattern to minimize potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas.

8. Interior and exterior finned areas must be thoroughly cleaned.
9. Finned surfaces should remain wet with cleaning solution for 10 minutes.
10. Ensure surfaces are not allowed to dry before rinsing. Reapplying cleaner as needed to ensure 10-minute saturation is achieved.
11. Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

Condensate Drain Pan

Check and clean each year at the start of the cooling season.

To clean the condensate pan:

1. Disconnect condensate drain system from side or bottom drain connection.
2. Remove and clean trap.
3. Remove 4 screws securing condensate pan access cover to unit. Save screws and panel.
4. Slide condensate pan out from unit and clean. Pan is made of non-corrosive plastic. Use a mild cleaner to remove heavy deposits of dirt and grime.
5. Replace pan in unit.
6. Replace condensate pan access cover with 4 screws saved from Step 3.
7. Re-attach and prime condensate trap.
8. Connect condensate drainage system.

NOTE: During winter in low (subfreezing) temperature regions, add antifreeze solutions to the drain. Protect against contact with children, pets and animals.

Filters

Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to Table 1 and 2 for type and size.

Outdoor-Air Inlet Screens

Clean screens with steam or hot water and a mild detergent.

Lubrication

Compressors

Each compressor is charged with the correct amount of oil at the factory.

⚠ CAUTION

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this caution may result in personal injury and equipment damage.

The compressor is in a Puron® refrigerant system and uses a polyolester (POE) oil. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Avoid exposure of the oil to the atmosphere.

Polyolester (POE) compressor lubricants are known to cause long term damage to some synthetic roofing materials. Exposure, even if immediately cleaned up, may cause roofing materials to become brittle (leading to cracking) within a year. When performing any service which may risk exposure of compressor oil to the roof, take appropriate precautions to protect roofing. Procedures which risk oil leakage include compressor replacement, repairing refrigerant leaks, and replacing refrigerant components. To prepare rooftop:

1. Cover extended roof work area with an impermeable plastic dropcloth or tarp. Make sure a 10 x 10 ft area around the work area is covered.

2. Cover area in front of the unit service panel with a terry cloth shop towel to absorb lubricant spills and prevent run-offs. Towel will also protect dropcloth from tears caused by tools or components.
3. Place terry cloth shop towel inside the unit directly under components to be serviced to prevent spills through the bottom of the unit.
4. Perform the required service.
5. Remove and dispose of any oil contaminated material per local codes.

Indoor Fan Shaft Bearings (Sizes 08-14)

The indoor fan has permanently sealed bearings. No field lubrication is necessary.

Indoor Fan Shaft Bearings (Size 16)

Lubricate bearings at least every 6 months with suitable bearing grease. Typical lubricants are given below:

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

*Preferred lubricant because it contains rust and oxidation inhibitors.

Condenser and Evaporator-Fan Motor Bearings

The condenser-fan and evaporator-fan motors have permanently sealed bearings, so no field lubrication is necessary.

Evaporator Fan Service and Replacement

The 50PG units feature a slide-out fan deck for easy servicing of the indoor-fan motor, pulleys, belt, and bearings. To service components in this section, perform the following procedure:

1. Turn off unit power.
2. Open the fan section access door.
3. Remove two no. 10 screws at front of slide-out fan deck. Save screws. (See Fig. 29.)
4. Disconnect the electrical wires connected to the slide-out fan deck (supply air thermistor and fan status switch if installed). Wires may be damaged if not disconnected.
5. Fan deck can now be slid out to access serviceable components.

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in unit damage and/or personal injury.

DO NOT SLIDE FAN DECK OUT PAST THE FAN DECK STOP. If further access is required, the fan deck must be supported. Make sure plugs and wiring are not pinched between fan housing and unit sheet metal post.

6. To replace fan deck to operating position, slide fan deck back into the unit. Secure with the two no. 10 screws removed in Step 3.
7. Re-attach electrical wires.
8. Close fan section access door.
9. Restore power to unit.

Evaporator Fan Performance Adjustment (See Fig. 29 and 30.)

Fan motor pulleys are factory set for speed shown in Table 19.

To change fan speeds:

1. Shut off unit power supply.

2. Loosen nuts on the 4 carriage bolts in the mounting base. Using adjusting bolts and plate, slide motor and remove belt.
3. Loosen movable-pulley flange setscrew. (See Fig. 30.)
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 19.

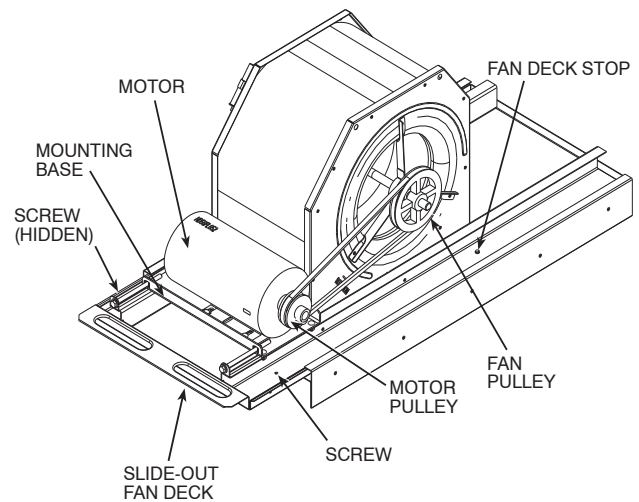


**Fig. 29 – Evaporator-Fan Motor Adjustment
(Sizes 08-14 Shown)**

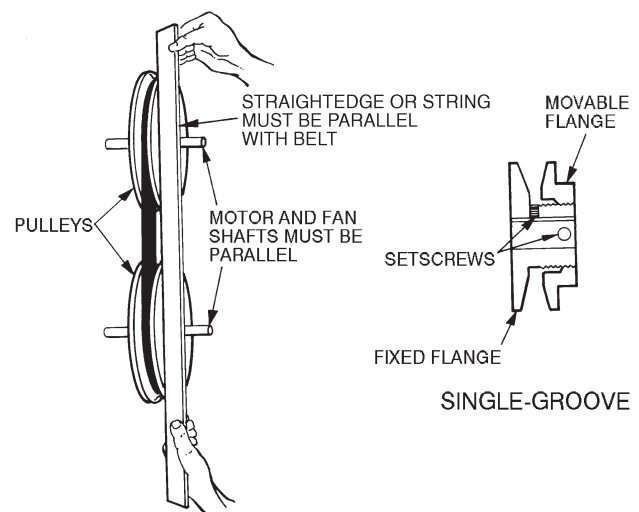


Fig. 30 – Evaporator-Fan Alignment and Adjustment

See Table 17 for air quantity limits.

5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 19 for speed change for each full turn of pulley flange.)
6. Replace belts.
7. Realign fan and motor pulleys:
 - a. Loosen fan pulley setscrews.
 - b. Slide fan pulley along fan shaft.
 - c. Make angular alignment by loosening motor from mounting plate.
8. Tighten belts.
9. Restore power to unit.

Evaporator Fan Belt Tension Adjustment

To adjust belt tension:

1. Turn off unit power.
2. Slide out fan deck to service position as shown in Evaporator Fan Service and Replacement section above.
3. Loosen motor mounting plate bolts.
4. Move motor mounting plate to adjust to proper belt tension. Motor adjuster bolts may be used to tighten belts. (See Fig. 29.) Do not overtighten belt.
5. Check for proper belt alignment. Adjust if necessary.
6. Tighten motor mounting plate bolts to lock motor in proper position.
7. Return fan deck back into operating position.
8. Restore power to unit.

Condenser-Fan Adjustment (See Fig. 31.)

1. Shut off unit power supply.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 31.
4. Tighten setscrews and replace condenser-fan assembly.
5. Turn on power to unit.

Verify Sensor Performance

Using an ohmmeter and a thermometer, compare measured temperature to the resistance shown in Table 21.

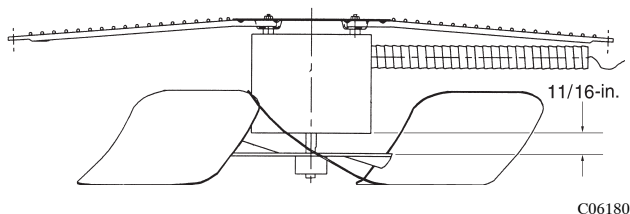


Fig. 31 – Condenser-Fan Adjustment

Table 21—Sensor Temperature/Resistance Values

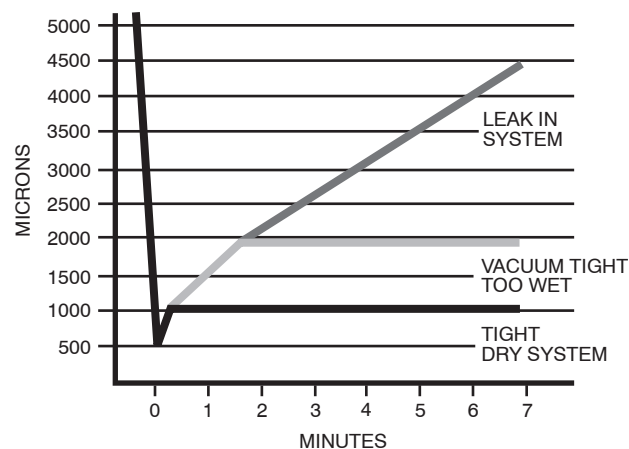
TEMPERATURE (F)	RESISTANCE (ohms)
-58	200,250
-40	100,680
-22	53,010
-4	29,091
14	16,590
32	9,795
50	5,970
68	3,747
77	3,000
86	2,416
104	1,597
122	1,080
140	746
158	525
176	376
185	321
194	274
212	203
230	153
248	116
257	102
266	89
284	70
302	55

Economizer Operation During Power Failure

Dampers have a spring return. In event of power failure, dampers will return to fully closed position until power is restored. *Do not manually operate damper motor.*

Evacuation

Proper evacuation of the system will remove noncondensables and ensure a tight, dry system before charging. Evacuate from both high and low side ports. Never use the system compressor as a vacuum pump. Refrigerant tubes and indoor coil should be evacuated to 500 microns. Always break a vacuum with dry nitrogen. The two possible methods are the deep vacuum method and the triple evacuation method.



C06264

Fig. 32 – Deep Vacuum Graph

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a minimum vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. (See Fig. 32.)

Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is capable of pumping down to 28 in. of mercury and system does not contain any liquid water. Proceed as follows:

1. Pump system down to 28 in. of mercury and allow pump to continue operating for an additional 15 minutes.
2. Close service valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
4. Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system, absorbing moisture.
5. Repeat this procedure. System will then contain minimal amounts of contaminants and water vapor.

Refrigerant Charge

Amount of refrigerant charge is listed on unit nameplate. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures. Unit panels must be in place when unit is operating during charging procedure.

Puron® (R-410A) refrigerant cylinders contain a dip tube which allows liquid refrigerant to flow from the cylinder in an upright position. Charge units with cylinder in the upright position and a commercial type metering device in the manifold hose.



CAUTION

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this caution may result in personal injury or equipment damage.

This system uses Puron® (R-410A) refrigerant which has higher pressures than standard R-22 and other refrigerants. No other refrigerant may be used. Gauge set, hoses, and recovery system must be designed to handle Puron refrigerant. If unsure about equipment, consult the equipment manufacturer.

NOTE: Do not use recycled refrigerant as it may contain contaminants.

No Charge

Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to unit nameplate).

Low Charge Cooling

Using cooling charging chart (see Fig. 33-36), add or remove refrigerant until conditions of the chart are met. An accurate pressure gage and temperature-sensing device is required. Charging is accomplished by ensuring the proper amount of liquid subcooling. Connect pressure gauge to the compressor discharge service valve. Connect temperature sensing device to the liquid line between the condenser and the TXV (thermostatic expansion valve) and insulate it so that ambient temperature does not affect reading.

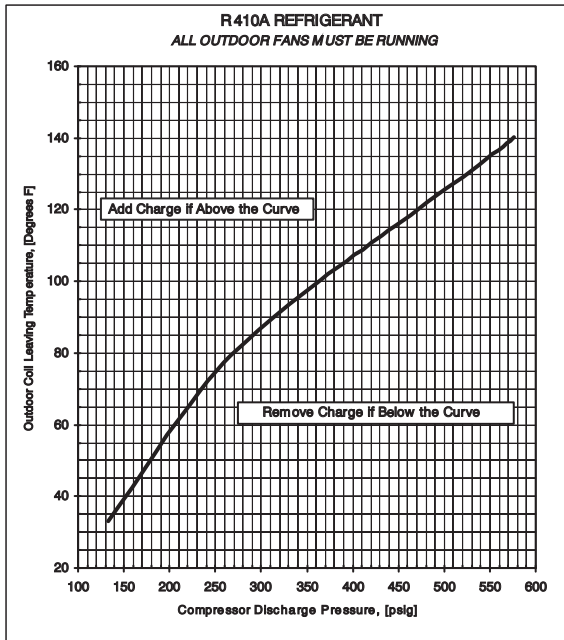


Fig. 33 – Charging Chart 50PG08 and 09

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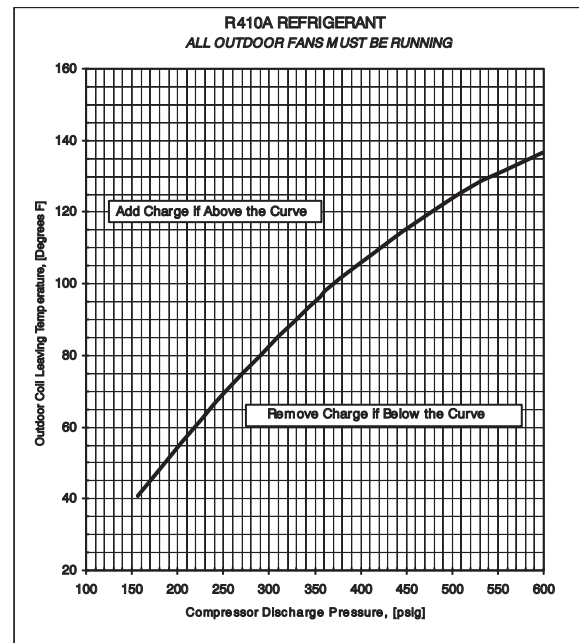


Fig. 34 – Charging Chart 50PG12

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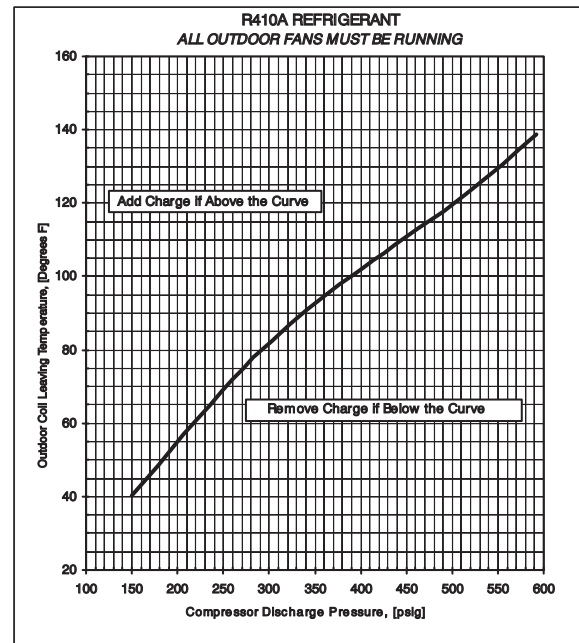
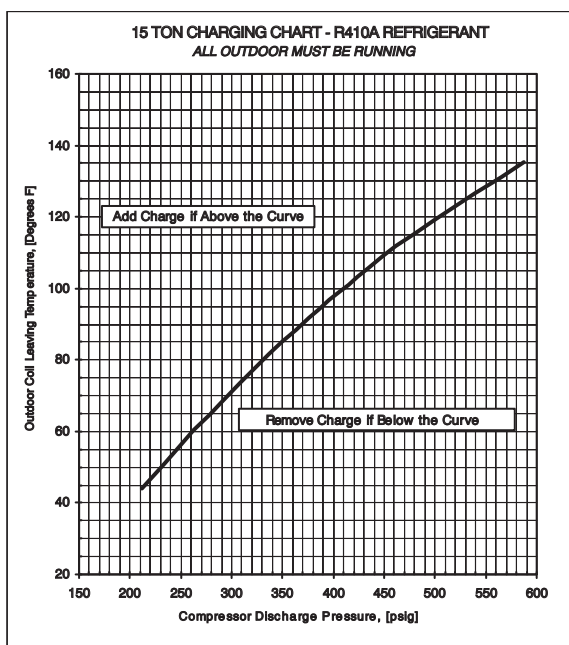


Fig. 35 – Charging Chart 50PG14

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C06268

Fig. 36 – Charging Chart 50PG16

To Use the Cooling Charging Chart

Use the above temperature and pressure readings, and find the intersection point on the cooling charging chart. If intersection point on chart is above line, add refrigerant. If intersection point on chart is below line, carefully recover some of the charge. Recheck suction pressure as charge is adjusted.

NOTE: Indoor-air cfm must be within normal operating range of unit. All outdoor fans must be operating.

The TXV is set to maintain between 10 and 15 degrees of superheat at the compressors. The valves are factory set and cannot be adjusted. Do not use an R-22 TXV.

Puron® Refrigerant

Puron refrigerant operates at 50 to 70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with Puron refrigerant. Do not mix with components that have been used with other refrigerants. Puron refrigerant, as with other HFCs, is only compatible with POE oils.

Recovery cylinder service pressure rating must be 400 psig. Puron systems should be charged with liquid refrigerant. Use a commercial-type metering device in the manifold hose. Manifold sets should be 750 psig high-side and 200 psig low-side with 520 psig low-side retard. Use hoses with 750 psig service pressure rating. Leak detectors should be designed to detect HFC refrigerant.

Filter Drier

Replace whenever refrigerant system is exposed to atmosphere. Only use factory specified liquid-line filter driers with working pressures no less than 650 psig. Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with Puron refrigerant is required on every unit.

Protective Devices**Compressor Rotation****High Pressure Switch**

If the high-pressure switch opens, the compressor will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The high-pressure switch will reset automatically as the refrigerant pressure drops below its reset level. The CLO will remain energized until manually reset.

Low-Pressure Switch

If the low-pressure switch opens, the compressor will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The low-pressure switch will reset automatically as the refrigerant pressure rises above its reset level. The CLO will remain energized until manually reset.

Freeze Protection Switch

This switch is installed on each evaporator coil section to provide protection against continued unit operation with a frosted evaporator surface. If the freeze protection switch opens, the compressor on this circuit will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The freeze protection switch will reset as the evaporator tube temperature rises above its reset level. The CLO will remain energized until manually reset.

Compressor Lockout (CLO) Device

The CLO prevents automatic recycling of the compressor as safety controls reset. If the high-pressure switch, low-pressure switch or freeze protection switch opens, the CLO device will energize to block further compressor operation. To reset the CLO (after all safety switches have reset), either open the thermostat to remove the cooling demand signal (and then re-close) or cycle the control power in the unit.

Overcurrent

Each compressor has internal line break motor protection.

Overtemperature

Each compressor has an internal protector to protect it against excessively high discharge gas temperatures.

Evaporator Fan Motor Protection

Indoor fan motors less than 5 hp are equipped with internal overcurrent and overtemperature protection. Protection devices reset automatically. Disconnect and lock out power when servicing motor. Indoor fan motors 5 hp and larger are equipped with a manual reset, calibrated trip, magnetic circuit breaker and overcurrent protection. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Condenser-Fan Motor Protection

Each condenser-fan motor is internally protected against overtemperature.

Relief Devices

All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side and are located at the suction line service port. Protect joint during brazing operations near joint.

Control Circuit, 24-V

Each control circuit is protected against overcurrent by a 3.2 amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting. (See Fig. 37 and 38.)

Replacement Parts

A complete list of replacement parts may be obtained from any Carrier distributor upon request.

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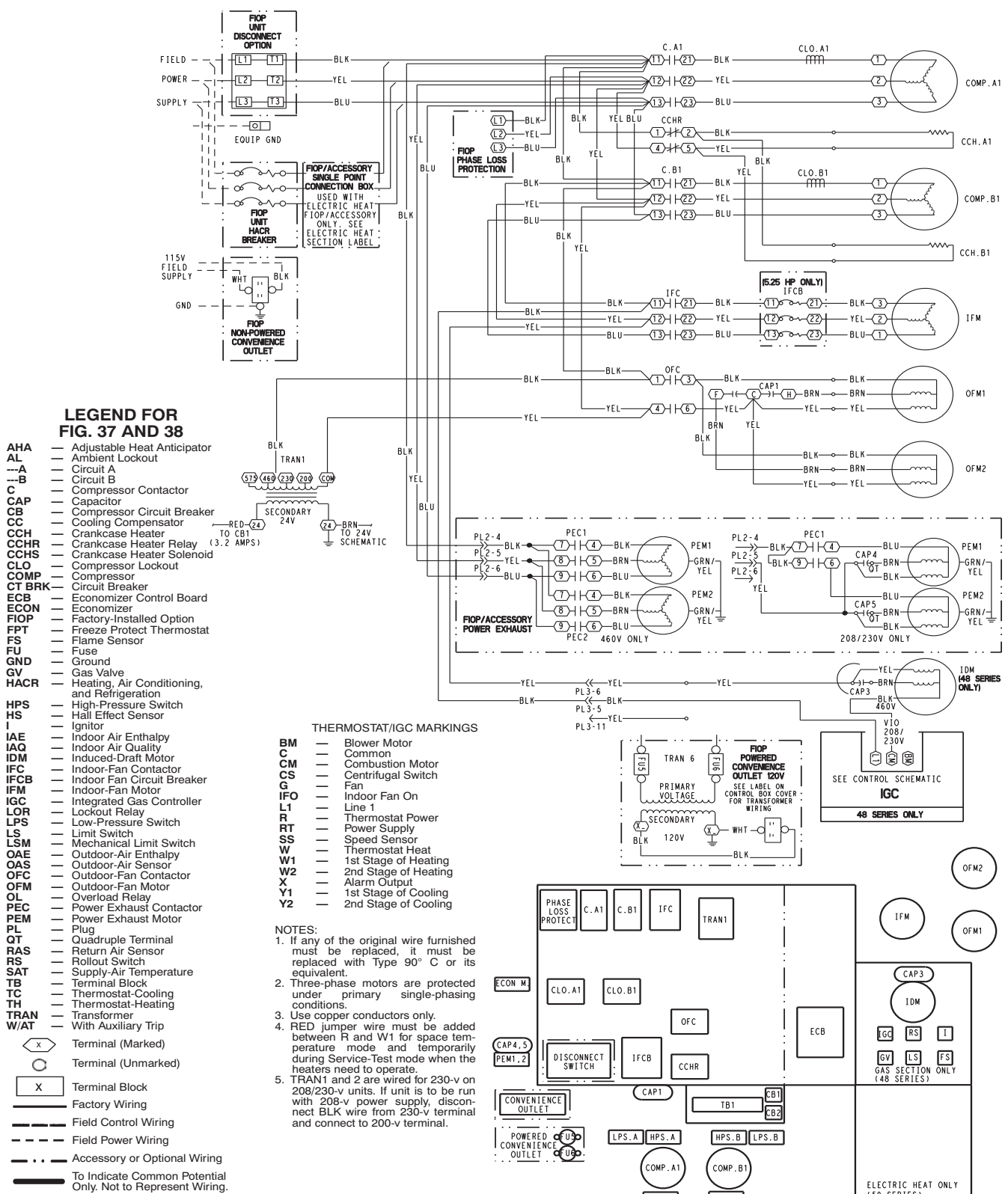


Fig. 38 – Typical Power Schematic

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TROUBLESHOOTING

Unit Troubleshooting – See Table 22 for cooling troubleshooting.

See Table 23 for unit heating troubleshooting.

Table 22—Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and Condenser Fan Will Not Start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
Compressor Will Not Start But Condenser Fan Runs.	Thermostat setting too high.	Lower thermostat setting below room temperature.
	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, start relay.	Determine cause and replace.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor Cycles (Other Than Normally Satisfying Thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor Operates Continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
	Dirty air filter.	Replace filter.
Excessive Head Pressure.	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
Head Pressure Too Low.	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
	High heat load.	Check for source and eliminate.
Excessive Suction Pressure.	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
	Dirty air filter.	Replace filter.
Suction Pressure Too Low.	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Outdoor ambient below 25°F.	Install low-ambient kit.
	Time off delay not finished.	Wait for 30-second off delay.
Evaporator Fan Will Not Shut Off.	Time off delay not finished.	Wait for 30-second off delay.

Table 23—Heating Service Analysis

PROBLEM	CAUSE	REMEDY
No Heat.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped. CB1, CB2, CB3.	Replace fuse or reset circuit breaker.
	Thermostat not calling for heating.	Check thermostat.
	No 24 vac at primary contactor.	Check transformer and circuit breaker.
	No power (high voltage) to L2 of primary contactor.	Check safety switches, one shot backup, and auto limit.
	Bad electrical elements.	With power off, remove high voltage wires and check resistance of heater. Replace if open.

EconoMi\$er IV Troubleshooting

EconoMi\$er IV Preparation

This procedure is used to prepare the EconoMi\$er IV for troubleshooting. No troubleshooting or testing is done by performing the following procedure.

NOTE: This procedure requires a 9-v battery, 1.2 kilo-ohm resistor, and a 5.6 kilo-ohm resistor which are not supplied with the EconoMi\$er IV.

IMPORTANT: Be sure to record the positions of all potentiometers before starting troubleshooting.

1. Disconnect power at TR and TR1. All LEDs should be off. Exhaust fan contacts should be open.
2. Disconnect device at P and P1.
3. Jumper P to P1.
4. Disconnect wires at T and T1. Place 5.6 kilo-ohm resistor across T and T1.
5. Jumper TR to 1.
6. Jumper TR to N.
7. If connected, remove sensor from terminals S_O and +. Connect 1.2 kilo-ohm 4074EJM checkout resistor across terminals S_O and +.
8. Put 620-ohm resistor across terminals S_R and +.
9. Set minimum position, DCV set point, and exhaust potentiometers fully CCW (counterclockwise).
10. Set DCV maximum position potentiometer fully CW (clockwise).
11. Set enthalpy potentiometer to D.
12. Apply power (24 vac) to terminals TR and TR1.

Differential Enthalpy

To check differential enthalpy:

1. Make sure EconoMi\$er IV preparation procedure has been performed.
2. Place 620-ohm resistor across S_O and +.
3. Place 1.2 kilo-ohm resistor across S_R and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across S_O and +. The Free Cool LED should turn off.
5. Return EconoMi\$er IV settings and wiring to normal after completing troubleshooting.

Single Enthalpy

To check single enthalpy:

1. Make sure EconoMi\$er IV preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.
4. Return EconoMi\$er IV settings and wiring to normal after completing troubleshooting.

DCV (Demand Control Ventilation) and Power Exhaust

To check DCV and Power Exhaust:

1. Make sure EconoMi\$er IV preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9V battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90 and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV set point potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9 v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contacts will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return EconoMi\$er IV settings and wiring to normal after completing troubleshooting.

DCV Minimum and Maximum Position

To check the DCV minimum and maximum position:

1. Make sure EconoMi\$er IV preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi\$er IV settings and wiring to normal after completing troubleshooting.

Mixed Air Input

To check mixed air input:

1. Make sure EconoMi\$er IV preparation procedure has been performed.
2. Set the Enthalpy potentiometer to A. The Free Cool LED turns on. The actuator should drive to between 20 and 80% open.
3. Remove the 5.6 kilo-ohm resistor and jumper T to T1. The actuator should drive fully open.
4. Remove the jumper across T and T1. The actuator should drive fully closed.
5. Return EconoMi\$er IV settings and wiring to normal after completing troubleshooting.

Economi\$er IV Troubleshooting Completion

This procedure is used to return the EconoMi\$er IV to operation. No troubleshooting or testing is done by performing the following procedure.

1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting.
4. Set minimum position, DCV set point, and exhaust potentiometers to previous settings.
5. Remove 620-ohm resistor from terminals S_R and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals S_O and +. If used, reconnect sensor from terminals S_O and +.
7. Remove jumper from TR to N.
8. Remove jumper from TR to 1.
9. Remove 5.6 kilo-ohm resistor from T and T1. Reconnect wires at T and T1.
10. Remove jumper from P to P1. Reconnect device at P and P1.
11. Apply power (24 vac) to terminals TR and TR1.

Phase Loss Protection

The phase loss protection option will monitor the three-phase electrical system to provide phase reversal and phase loss protection.

Phase Reversal Protection

If the control senses an incorrect phase relationship, the relay (K1) will be de-energized (opening its contact). If the phase relationship is correct, the relay will be energized. The control has a self-bypass function after a pre-set time. If the control determines that the three phases stay in a correct relationship for 10 consecutive minutes, the relay will stay energized regardless of the phase sequence of three inputs as long as 24-vac control voltage is applied. This self-bypass function will be reset if all three phases are restored in a phase loss event.

Phase Loss Protection

If the reverse rotation board senses any one of the three phase inputs has no AC voltage, the relay will be deenergized (opening its contact). This protection is always active as long as 24-vac control voltage is applied, and is not affected by the self bypass function of the phase sequence monitoring function. However, in the event of phase loss, the relay will be re-energized only if all three phases are restored and the three phases are in the correct sequence.

A red LED is provided to indicate the function of the board. See the table below.

LED STATUS	FUNCTION
On Continuously	Relay contact closed (normal operation).
Blinking	Relay contact open (phase loss or phase reversal has occurred) — No power will be supplied to the control system.
Off	24 vac control power not present (off).

UNIT START-UP CHECKLIST

MODEL NO.: _____

SERIAL NO.: _____

DATE: _____

TECHNICIAN: _____

I. PRE-START-UP:

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY INSTALLATION OF OUTDOOR AIR HOOD
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SETSCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT SCROLL COMPRESSORS ARE ROTATING IN THE CORRECT DIRECTION
- ☐ VERIFY INSTALLATION OF THERMOSTAT
- ☐ VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AT LEAST 24 HOURS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
COMPRESSOR AMPS — COMPRESSOR A1	L1	_____	L2	_____	L3	_____
— COMPRESSOR B1	L1	_____	L2	_____	L3	_____
— COMPRESSOR C1 (16)	L1	_____	L2	_____	L3	_____
ELECTRIC HEAT AMPS (IF EQUIPPED)	L1	_____	L2	_____	L3	_____
SUPPLY FAN AMPS	L1	_____	L2	_____	L3	_____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE	_____	F DB (Dry Bulb)	
RETURN-AIR TEMPERATURE	_____	F DB	F WB (Wet Bulb)
COOLING SUPPLY AIR	_____	F	
ELECTRIC HEAT SUPPLY AIR	_____	F	

PRESSURES

REFRIGERANT SUCTION	CIRCUIT A	_____	PSIG
	CIRCUIT B	_____	PSIG
	CIRCUIT C (16)	_____	PSIG
REFRIGERANT DISCHARGE	CIRCUIT A	_____	PSIG
	CIRCUIT B	_____	PSIG
	CIRCUIT C (16)	_____	PSIG

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS